In the Name of GOD

Healthy diet tips to Strengthen Your Immunity relative to coronavirus

Present by

Dr. Yahya Pasdar

School of Nutritional Sciences and Food Technology

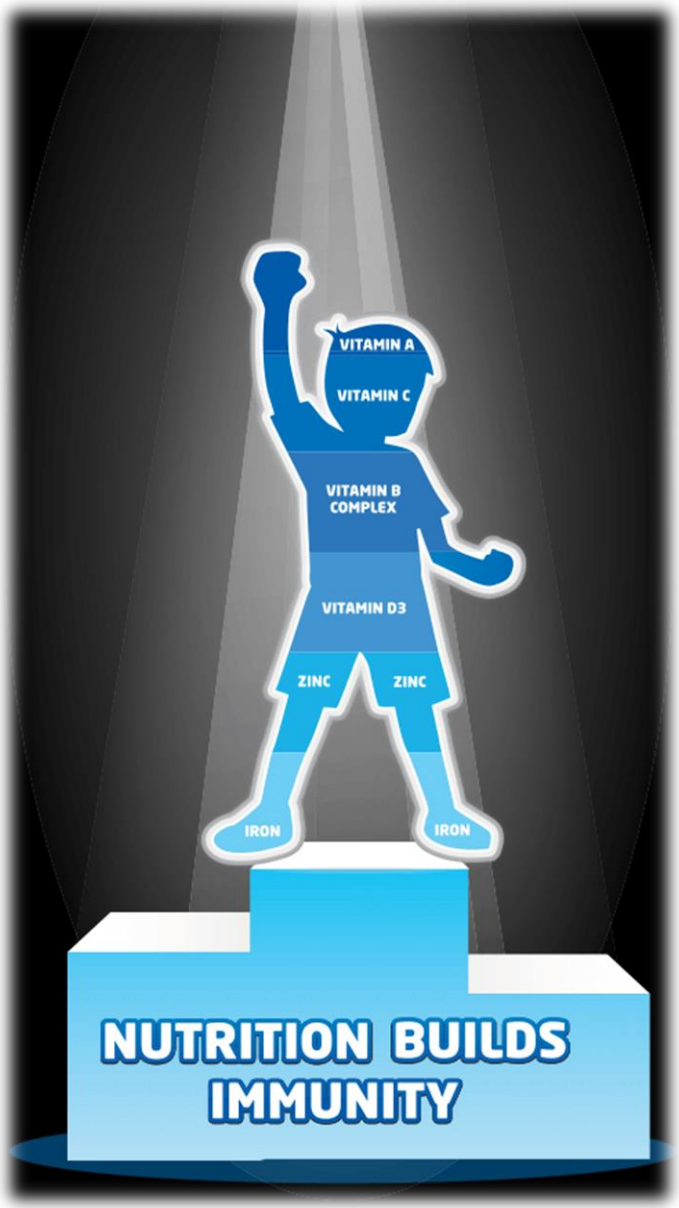
KUMS

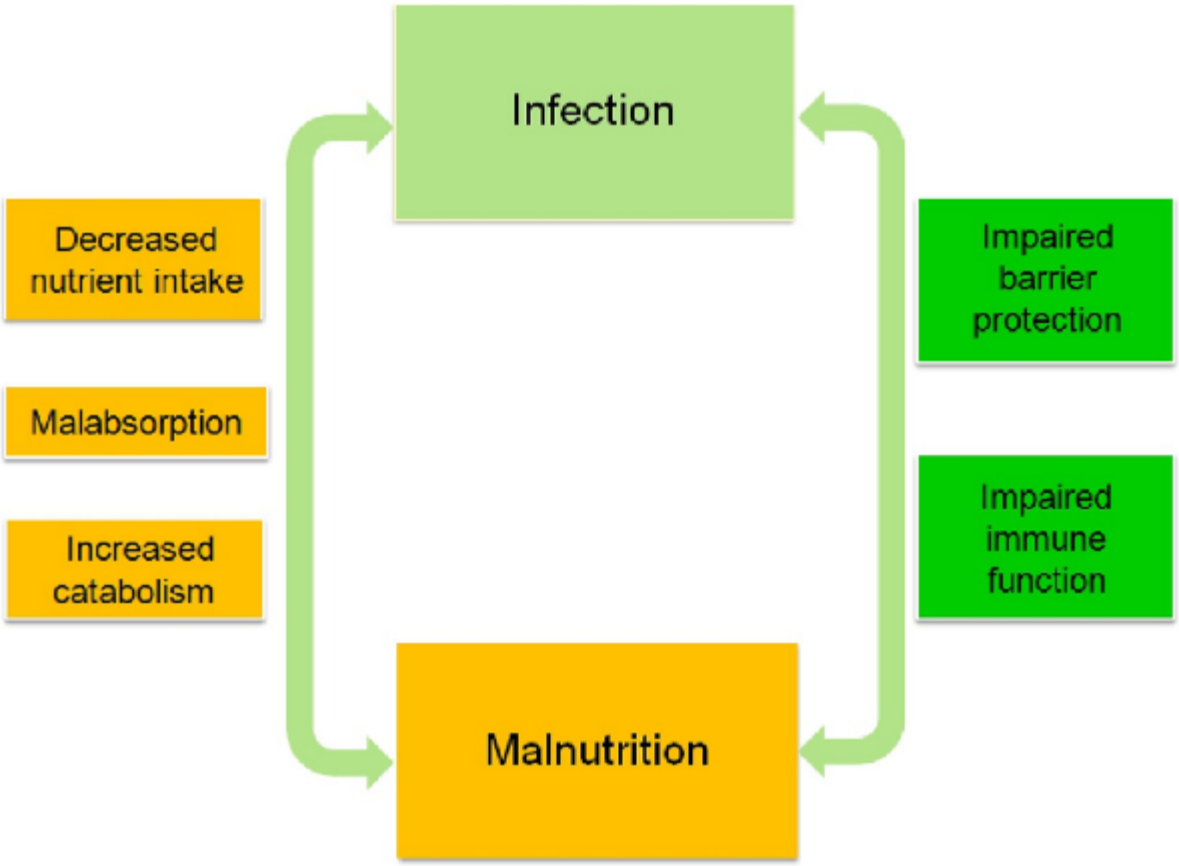
Proper nutrition and hydration are vital

Proper nutrition

- Adequacy
- Balance
- Calorie control
- Dense with nutrient
- Moderate
- Variety

Nutrition-Immunity link





Relationship between nutrition and infection

Gut is the largest “immune organ”

- Containing :
- >65% of all the immune cells in the body
- >90% of all Ig-producing cells
- In an adult human, the intestine contains 3-fold greater Ig-producing cells (about $7\times10_{10}$) as compared with bone marrow ($2.5\times10_{10}$).
- Thus, a significant part of the immune system interacts with what we eat.

Nutrition-Immunity link

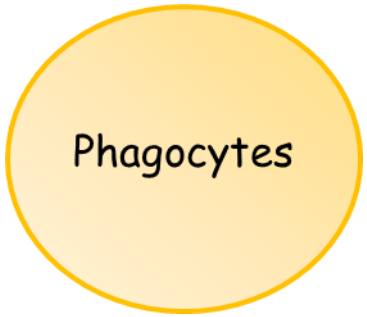
- Macronutrient deficiency
  - Protein, Calories
  - Malnutrition is the most common cause of immune deficiency world-wide
- Micronutrient deficiency
  - Elements, Vitamins
- Overnutrition
  - Excess of macronutrients

Protein-energy malnutrition

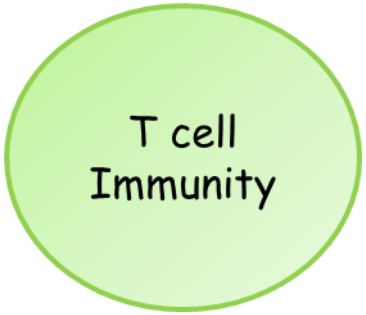
- Causes
  - Limited food access
  - Chronic disease
  - Chronic Pain
  - Dental/Feeding issues
  - Medications
  - Severe dieting

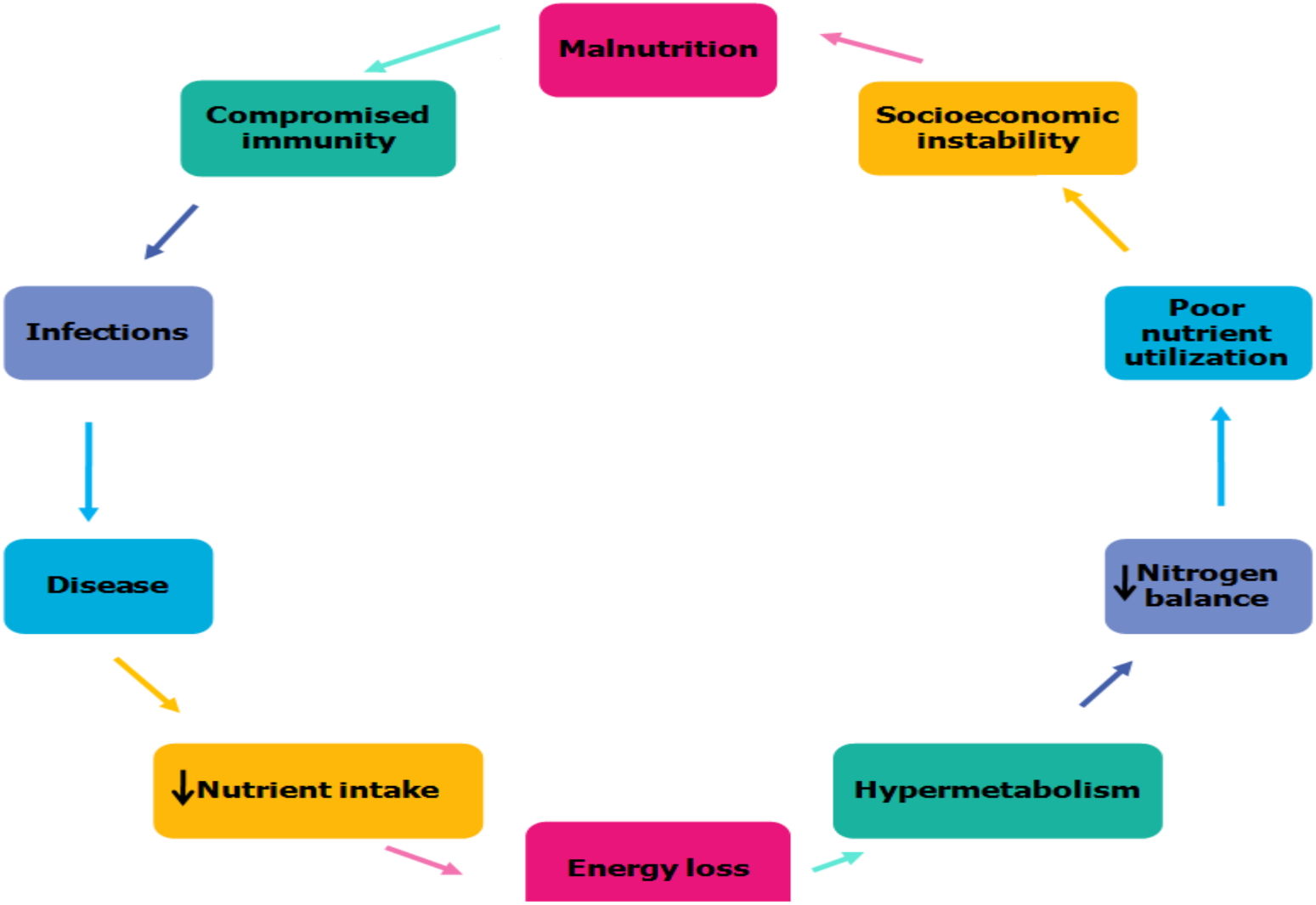
Protein-energy malnutrition

- Innate Immunity
  - Impaired phagocyte function



- Adaptive Immunity
  - T cells
    - Decreased numbers and function
    - Increased susceptibility to opportunistic infections





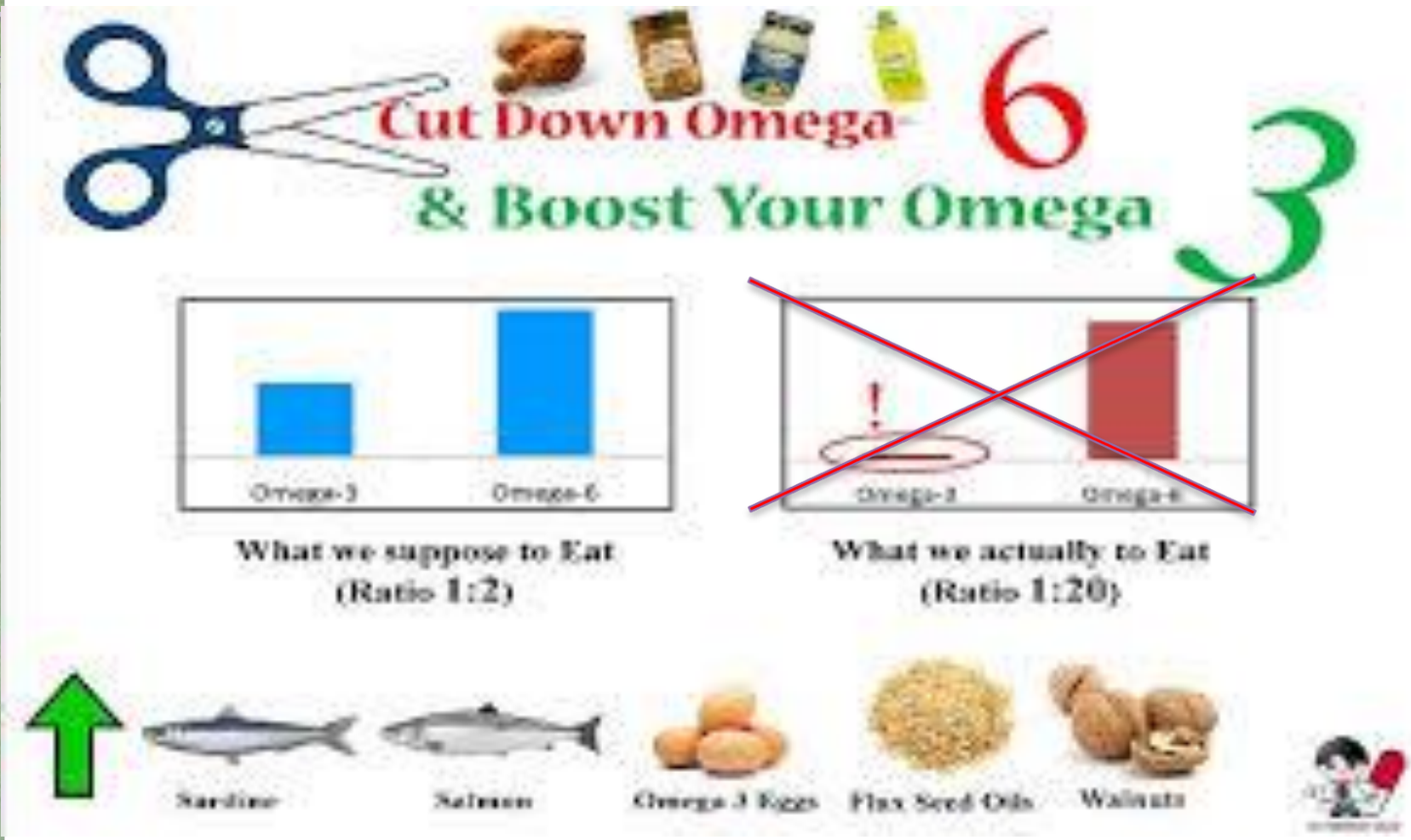
Protein Energy Malnutrition Increases Prevalence of Infection, Leading to Energy loss for the Individual

Omega-3 Fatty Acids

Polyunsaturated fats (PUFA)

- Eicosapentaenoic acid (EPA)
- Docosahexaenoic acid (DHA)
  - Decreased production of inflammatory cytokines
  - Increased response by white blood cells to control inflammation
  - Decrease in clotting problems, cholesterol, and triglycerides

Omega-3/Omega-6 Ratio



Micronutrients

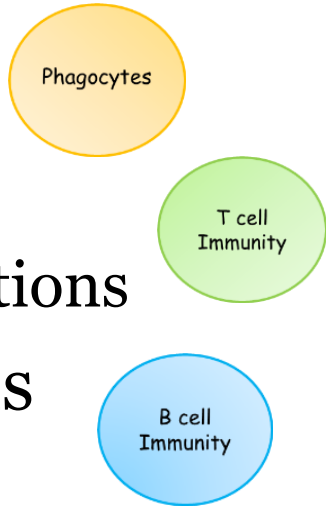
- Iron
- Zinc
- Copper
- Selenium
- Vitamins

Micronutrients- Iron

- Aids in T cell development
- Generates some “reactive oxygen species” to kill pathogens

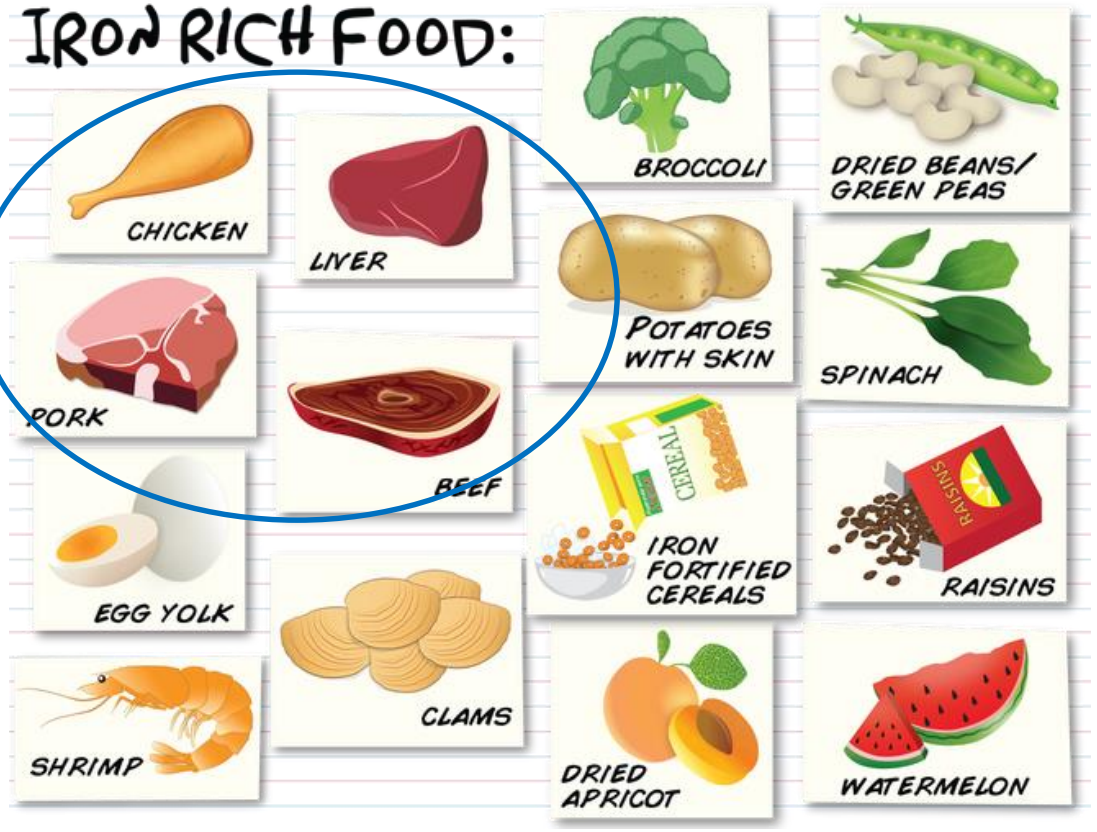
Micronutrients- Iron

- Deficiency associated with:
  - Anemia, paleness, fatigue
  - Infections
- Immune issues
  - Reduced phagocyte activity
  - Impaired T cell response
    - Risk of parasite and Candida infections
  - Reduced immunoglobulin levels



Micronutrients- Iron

- Supplementation
  - Recommended: 7-18mg/day

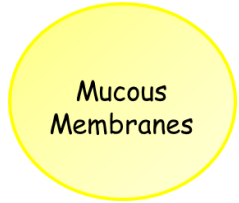


Micronutrients- Zinc

- Stimulates T cell production and subtype switching
- Stimulates complement system
- Stimulates phagocytes
  - Reduction in risk of **pneumonia**
  - Reduction in common **cold symptoms**
  - Reduction in infectious diarrhea (world-wide)
- <u>Antioxidant/Inflammatory Control</u>

Micronutrients- Zinc

- Deficiency associated with:
  - Skin lesions, hair loss
  - Loss of taste and smell, diarrhea
  - Infections, poor wound healing
- Immune issues
  - Increased susceptibility to infections (skin and GI system)
  - Impaired phagocytosis
  - Impaired NK cell activity
  - Low T and B cells



Micronutrients- Zinc

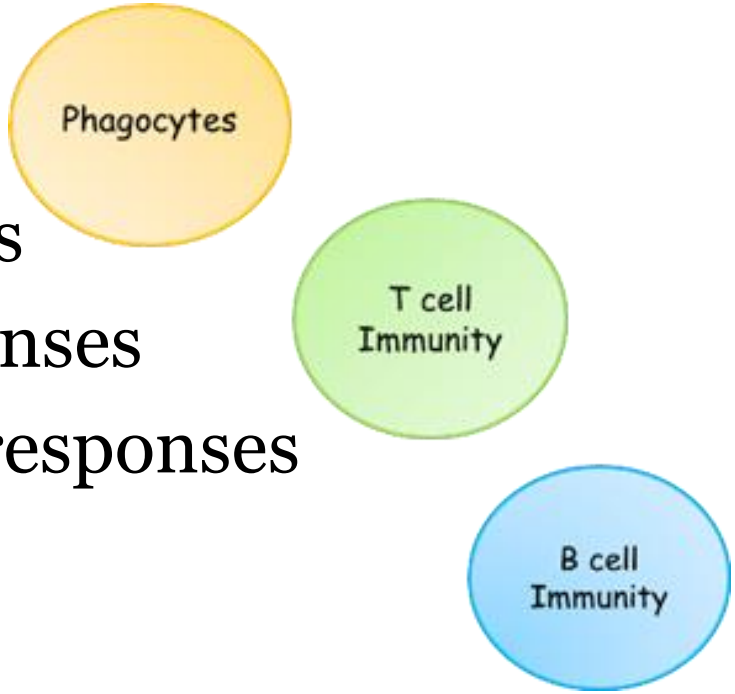
- Supplementation
  - Recommended daily dose: 3-11 mg/day of elemental zinc

Micronutrients- Copper

- Promotes T and B cell responses
  - IL-2 production
- Promotes phagocyte function

Micronutrients- Copper

- Deficiency associated with:
  - Neutropenia, anemia
  - Neurologic issues
- Immune issues
  - Low white blood cells
  - Reduced T cell responses
  - Reduced phagocyte responses
    - Neutropenia



Micronutrients- Copper

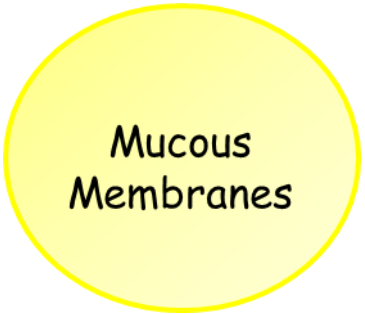
- Supplementation
  - Recommended: 350-900 mcg/day

Micronutrients- Selenium

- Antioxidant effects
  - Promotes production of limited reactive oxygen species (ROS) to fight infections
- Stimulates general immune responsiveness
  - T and B cell activation
  - Cytokine release

Micronutrients- Selenium

- Deficiency associated with:
  - More severe effects of **viral infections**
  - Muscle aches
- Immune issues
  - Loss of antioxidant host defense
  - Decreased white blood cell and NK cell function



Micronutrients- Selenium

- Supplementation
  - Recommended daily: 20-55 µg/day

Vitamin A

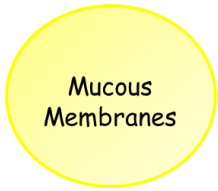
- Supports structure and function of mucosal cells of eyes, lungs, gastrointestinal tract
- Promotes response to bacterial infections
- Affects growth and function of B cells
- Affects activation of T cells

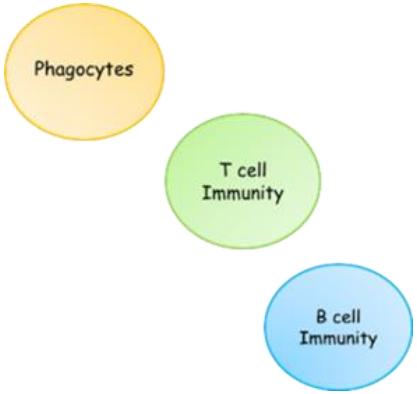
Vitamin A

- Deficiency associated with:
  - Dry eyes, night blindness
  - Diarrhea
  - **Respiratory infections**
  - Fat malabsorption

Vitamin A

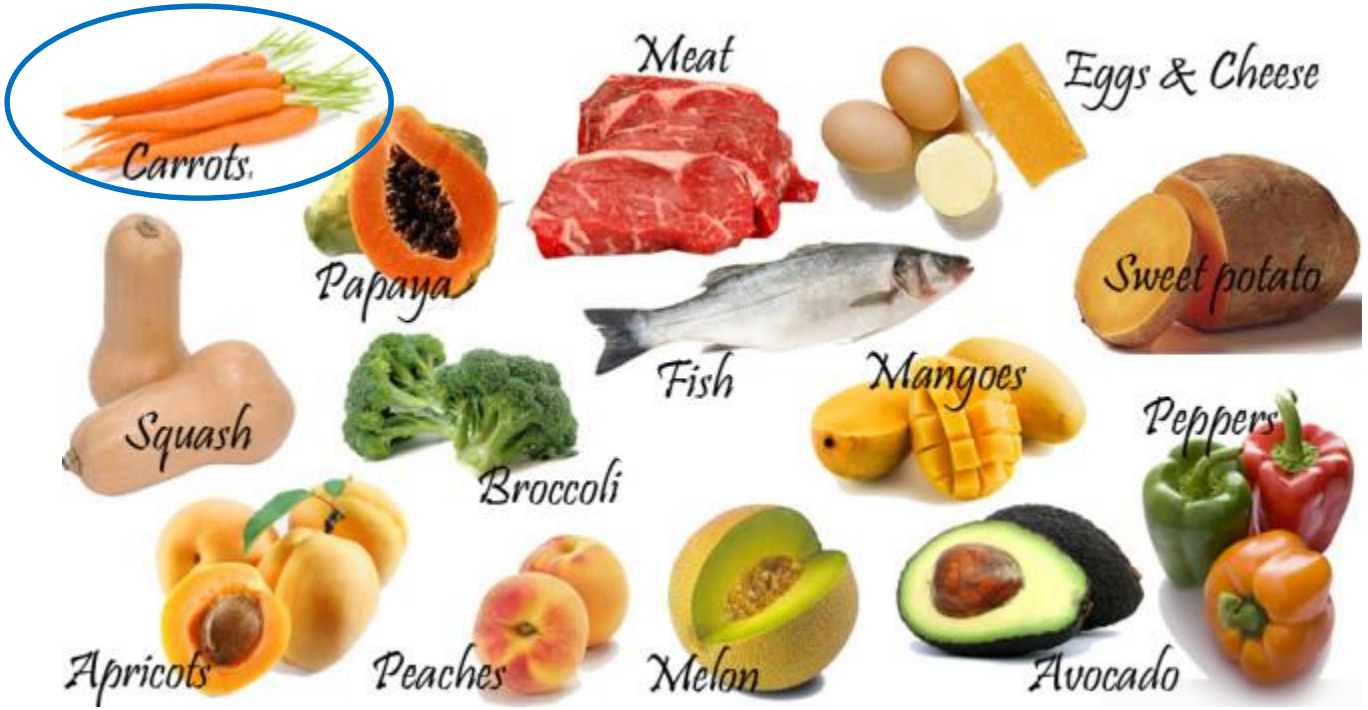
- Immune issues:
  - Loss of structure/function of cells on mucosal surfaces
    - Impaired resistance to infections, especially gastrointestinal
  - Diminished function of innate immunity
  - Impaired B and T cell responses





Vitamin A

- Supplementation
  - Recommended: 700-900 REA/day



Vitamin B

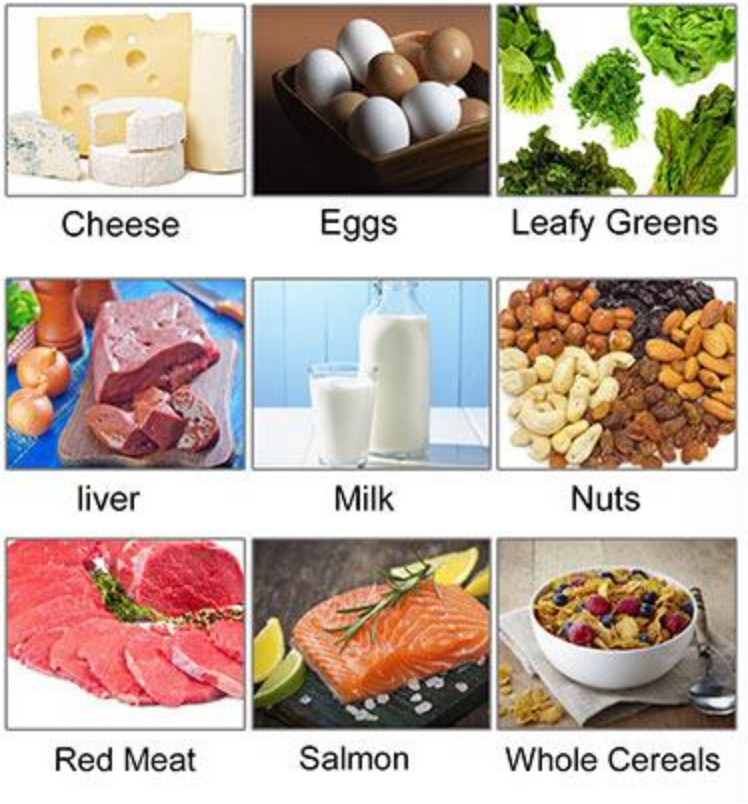
- B1- thiamin
- B2- riboflavin
- B3- niacin
- B5- pantothenic acid
- B6- pyridoxine
- B7- biotin
- B9- folic acid
- B12- cyanocobalmin

Vitamin B- all

- B1- thiamin
  - Aid in antibody responses
- B2- riboflavin
  - Aid in antibody responses
- B3- niacin
- B5- pantothenic acid
  - Aid in production and release of antibodies
- B6- pyridoxine
  - Aids in T and B cell production and maturation
- B7- biotin
- B9- folic acid
  - Aids in T cell production and maturation
- B12- cyanocobalamin
  - Promotes NK cell activity, aids in T and B cell production

Vitamin B- all

- Supplement
  - Range dependant on each vitamin



Vitamin C

- Antioxidant effects
  - Protects cells from reactive oxygen species (ROS) made by the body to control infections
  - **May have anti-viral activity**
    - May aid in symptoms of common cold because of ROS function on surface of airway and lung epithelium
  - Improvement in both innate and adaptive immunity function

Vitamin C

- Deficiency associated with:
  - Purpura/petechiae
  - Poor wound healing (scurvy)
- Immune issues:
  - Impaired collagen synthesis for barriers
  - Impaired antioxidant performance- increased free radical production

Vitamin C

- Supplementation
  - Recommended: 75-90 mg/day

Vitamin D

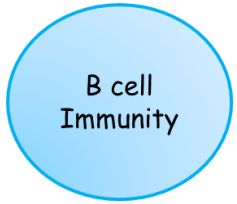
- Necessary for phagocytic activity
- Limits inflammatory response promoted by specific T cell subtypes
- Promotes wound healing

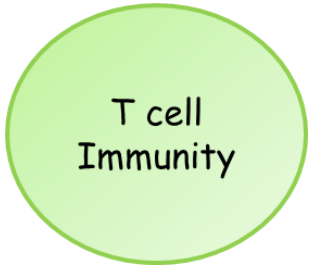
Vitamin D

- Deficiency associated with:
  - Rickets
  - Autoimmune diseases
  - Diabetes, type I
  - Atopic diseases

Vitamin D

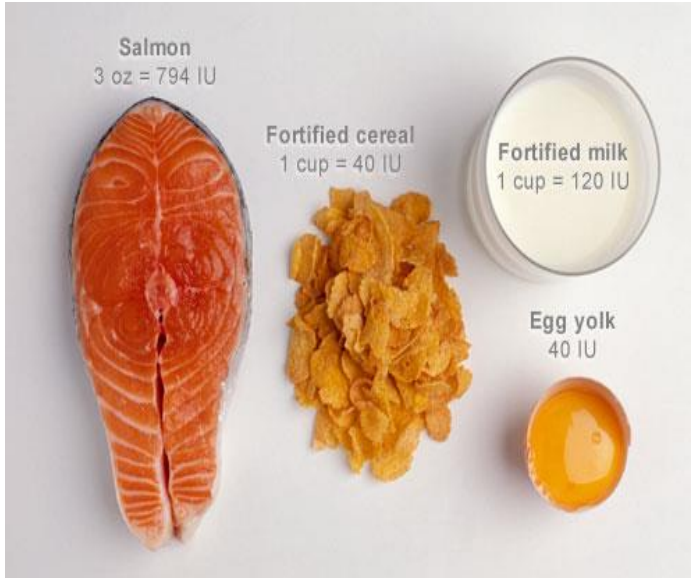
- Immune issues:
  - B cells
    - Decreased proliferation
    - Decreased immune globulin production
  - T cells- Decrease in overall proliferation
    - T_H1 cytokines decreased
    - T_H2 cytokines and T regulatory cells increased





Vitamin D

- Supplementation
  - Sunlight (5-30 min, 2x per week)
  - Foods- Fish, liver, fortified foods (milk, cheese, OJ)
  - Supplementation
    - Vitamins
      - Ergocalciferol (D2) or Cholecalciferol (D3)
      - Recommended: 600-800 IU
      - Replenishment: 1000-4000 IU



طبقه بندی کفایت ۲۵ دی هیدروکسی ویتامین D3 سرم (انجمن غدد درون ریز آمریکا)

طبقه بندی	۲۵ دی هیدروکسی ویتامین D3 (نانو گرم بر میلی لیتر)
کمبود(deficient)	< 20
ناکافی(insufficient)	21–29
کافی(sufficient)	> 30
مسمومیت(Toxic)	> 100

مقادیر مورد نیاز روزانه ویتامینD برحسب گروه سنی و فیزیولوژیک (منبع: Kraus 2017)

گروه سنی	واحد بین المللی در روز(Iu/d)
نوزادان ۰تا ۶ ماه	۴۰۰
نوزادان از ۶ ماه تا ۱ سال	۴۰۰
کودکان ۱ تا ۳ سال	۶۰۰
کودکان ۴ تا ۸ سال	۶۰۰
کودکان از ۸ تا ۱۸سال	۶۰۰
افراد ۱۹ تا سن ۷۰ سالگی	۶۰۰
افراد ۷۱ساله و بیشتر(زنان)	۶۰۰
افراد ۷۱ساله و بیشتر(مردان)	۸۰۰

برنامه کشوری مکمل یاری ویتامین D

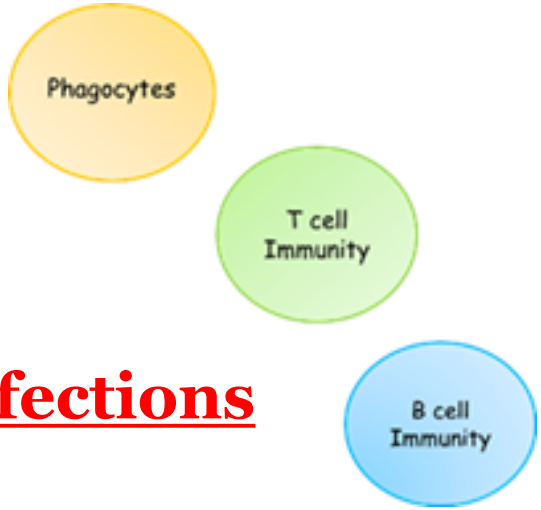
نام مکمل	شکل دارو	گروه سنی	مقدار و روش دادن مکمل
مولتی ویتامین یا ویتامین آ+د	قطره	شروع از روز ۳ تا ۵ تولد تا پایان ۲۴ ماهگی	روزانه یک سی سی قطره آ + د یا مولتی ویتامین معادل ۲۵ قطره در روز
ویتامین D	پرل	نوجوانان سن مدرسه (۱۸-۱۲ سال)	در طی ۹ ماه از سال تحصیلی یک عدد قرص ژله ای ۵۰ هزار واحدی
	پرل	جوانان	ماهانه یک عدد قرص ژله ای ۵۰ هزار واحدی
	پرل	میانسالان	ماهانه یک عدد قرص ژله ای ۵۰ هزار واحدی
	پرل	سالمندان	ماهانه یک عدد قرص ژله ای ۵۰ هزار واحدی
	پرل	مادران باردار	از شروع بارداری تا هنگام زایمان روزانه یک عدد قرص ژله ای ۱۰۰۰ واحدی
	پرل	مادران شیرده	در ۶ ماهه اول شیردهی روزانه یک عدد قرص ژله ای ۱۰۰۰ واحدی
کلسیم/ کلسیم D	قرص	سالمندان	روزانه یک عدد قرص حاوی ۲۰۰ یا ۴۰۰ یا ۵۰۰ میلی گرم کلسیم و ۴۰۰ واحد بین المللی ویتامین D

Vitamin E

- Antioxidant
  - Protects against cell damage from free radicals
  - Affects innate and adaptive immunity

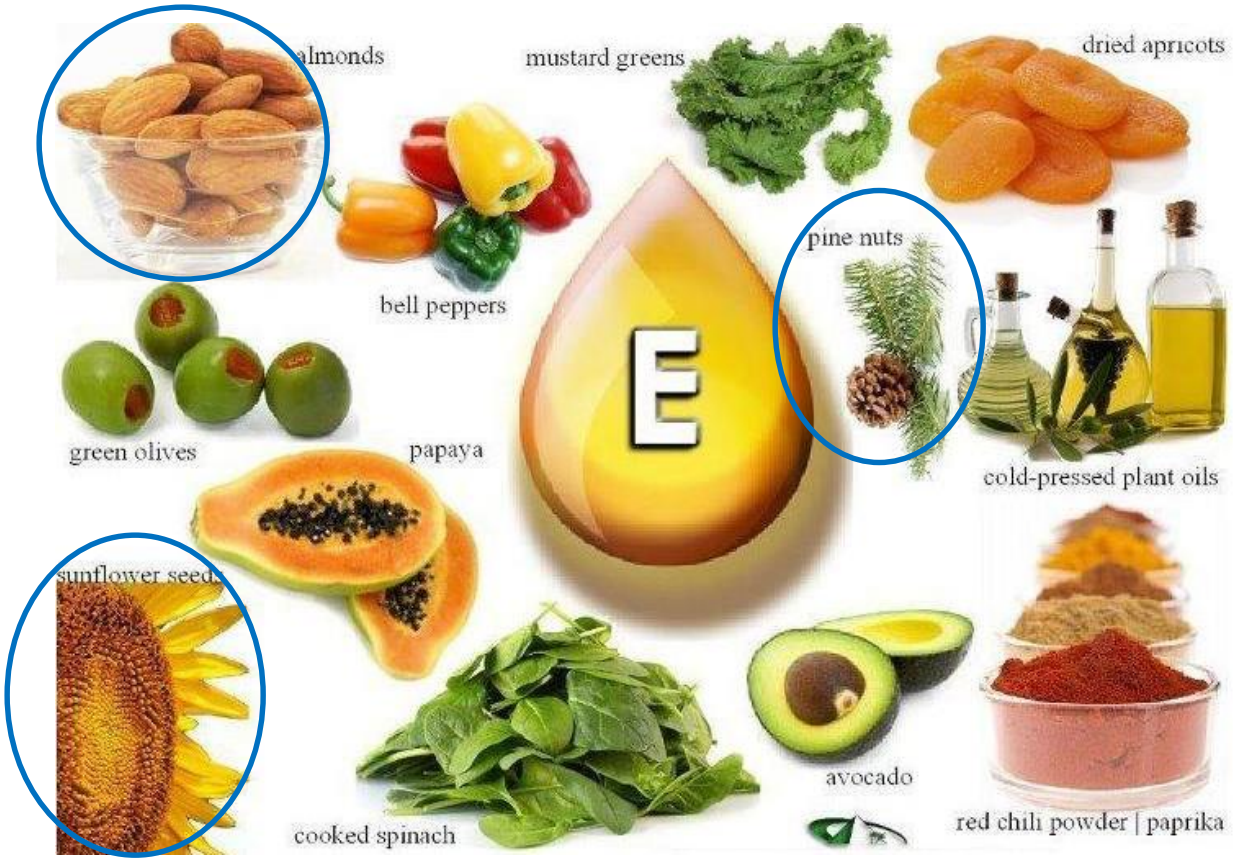
Vitamin E

- Deficiency associated with:
  - Neurologic symptoms
  - Atopic disease
- Immune issues:
  - Loss of phagocyte responses
  - T and B cell dysfunction
  - **Difficulty controlling viral infections**



Vitamin E

- Supplementation
  - Recommended: 15 a-TE/day



Garlic

- Used for both food and medicine for thousands of years
- Allicin- exact function unknown
  - Anti-bacterial
  - **Helps control viruses**
  - Anti-fungal
- Human studies have shown short-term, laboratory effects

Probiotics

- *Lactobacilli, Bifidobacteria* species
  - Strengthen gut barrier
  - Stimulate production of T cells
  - Stimulate production of antibodies
  - Must be ingested regularly for effects
- Foods with probiotics: fermentation

Over nutrition and Obesity

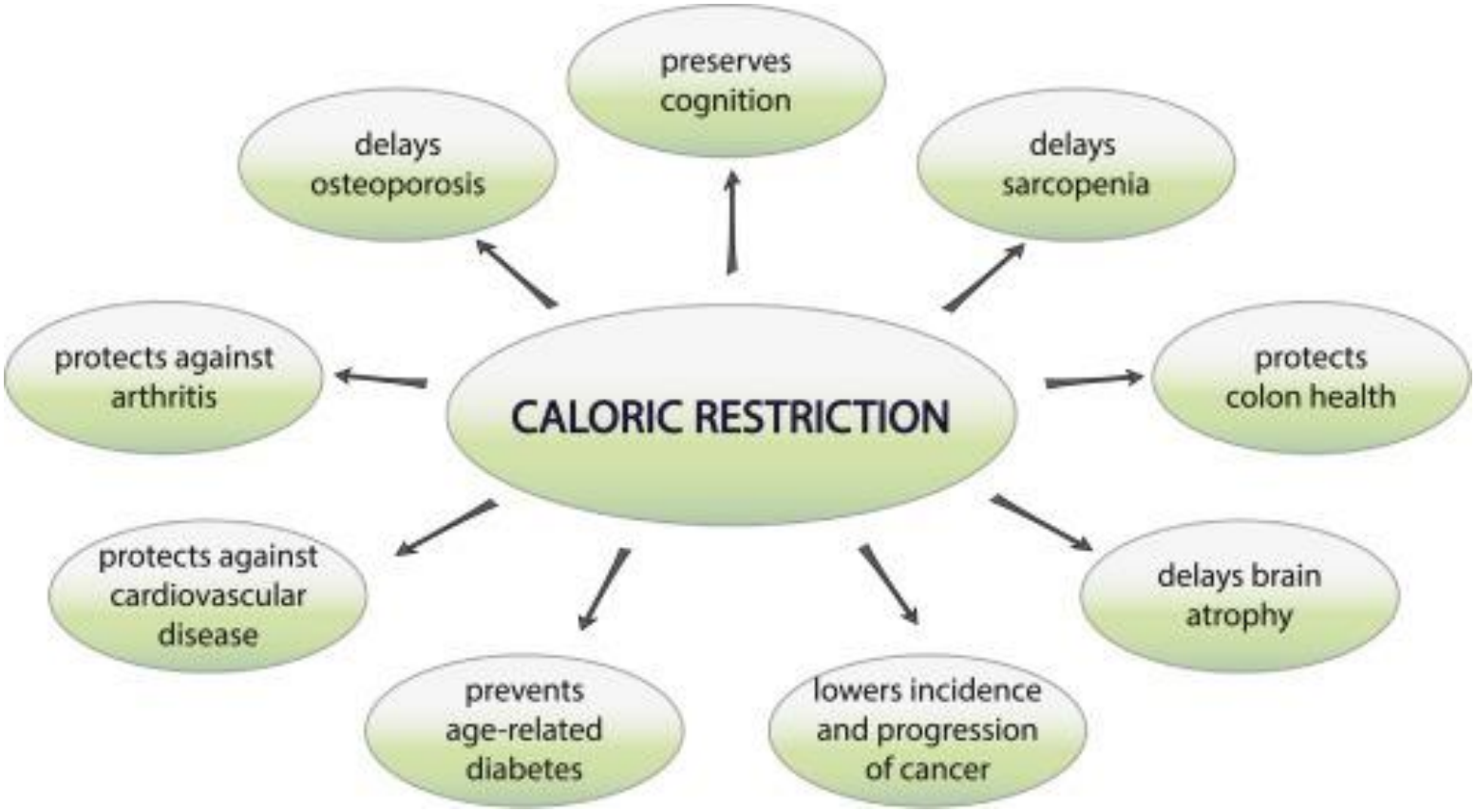
- Promotes inflammation
- Promotion of immune system stimulation causing autoimmunity
- Poor wound healing
- Increased susceptibility to **respiratory**, gastrointestinal, risk for nosocomial, **viral** (tuberculosis, H-pylori) and liver infections
- And a worse outcome, as shown in the 2009 **influenza** a pandemic.

Calorie restriction

- Studies of rodents have shown that CR without malnutrition has powerful, cancer-protective effects (up to 62% reduction in cancer incidence), and it increases maximal life span by as much as 60%

Calorie restriction

- Data are accumulating on the long-term effects of CR without malnutrition in nonhuman and human primates.
- In both, CR with adequate nutrition protects against obesity, type 2 diabetes, hypertension, and cardiovascular diseases, which are by far the primary causes of death in developed countries


preserves cognition
delays osteoporosis
delays sarcopenia
protects against arthritis
CALORIC RESTRICTION
protects colon health
protects against cardiovascular disease
delays brain atrophy
prevents age-related diabetes
lowers incidence and progression of cancer

Calorie restriction

- Although the precise mechanisms for these beneficial effects of CR are not clear, substantial insights regarding mechanisms and metabolic adaptations have been gained.
- Mechanisms likely to be involved in these adaptations include ***neuroendocrine alterations, reductions in anabolic signaling through the insulin/IGF-I/TOR pathways, reductions in inflammation and oxidative stress, hormesis, and up-regulation of autophagy***

Summary

- The best way to "boost" you immune system is to include foods naturally rich in nutrients and vitamins
  - "**EAT YOUR COLORS**"
- Over supplementation can be detrimental:
  - Toxicity (Vitamin A)
  - Inhibition of phagocytes (zinc, iron, copper)
  - Obesity in relation to food excess

WHO guideline for prevention of COVID-19

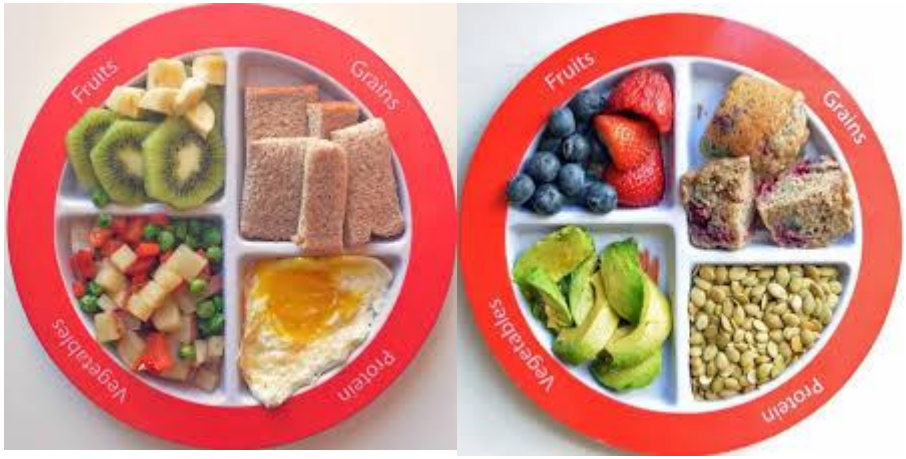
Eat fresh and unprocessed foods every day

- Eat fruits, vegetables,
- Legumes (e.g. lentils, beans)
- Nuts and whole grains (e.g. unprocessed maize, millet, oats, wheat
- Brown rice or starchy tubers or roots such as potato, yam, taro or cassava)
- Foods from animal sources (e.g. meat, fish, eggs and milk).

Eat fresh and unprocessed foods every day

Daily, eat:

- 2 cups of fruit (4 servings),
- 2.5 cups of vegetables (5 servings),
- 180 g of grains,
- 160 g of meat and beans (red meat can be eaten 1−2 times per week, and poultry 2−3 times per week).



Eat fresh and unprocessed foods every day

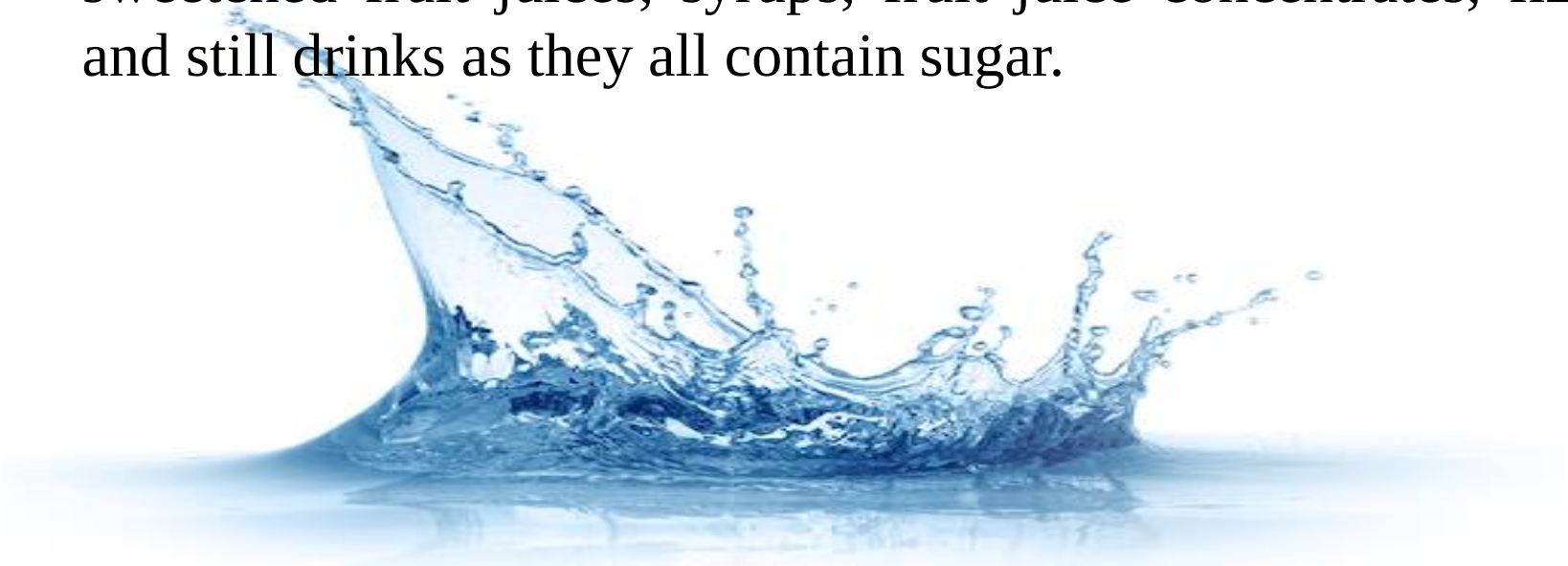
- For snacks, choose **raw vegetables and fresh fruit** rather than foods that are high in sugar, fat or salt.
- Do not **overcook** vegetables and fruit as this can lead to the loss of important vitamins.
- When using canned or dried vegetables and fruit, choose varieties **without added salt or sugar.**

Keep Yourself Hydrated

- **Water, water, water!**
- Make sure you are consuming enough water. Be it with Vitamin C supplements like lemon, or glucose or just water with ginger/coriander, it removes all the toxins from your body. Keep your immunity intact.

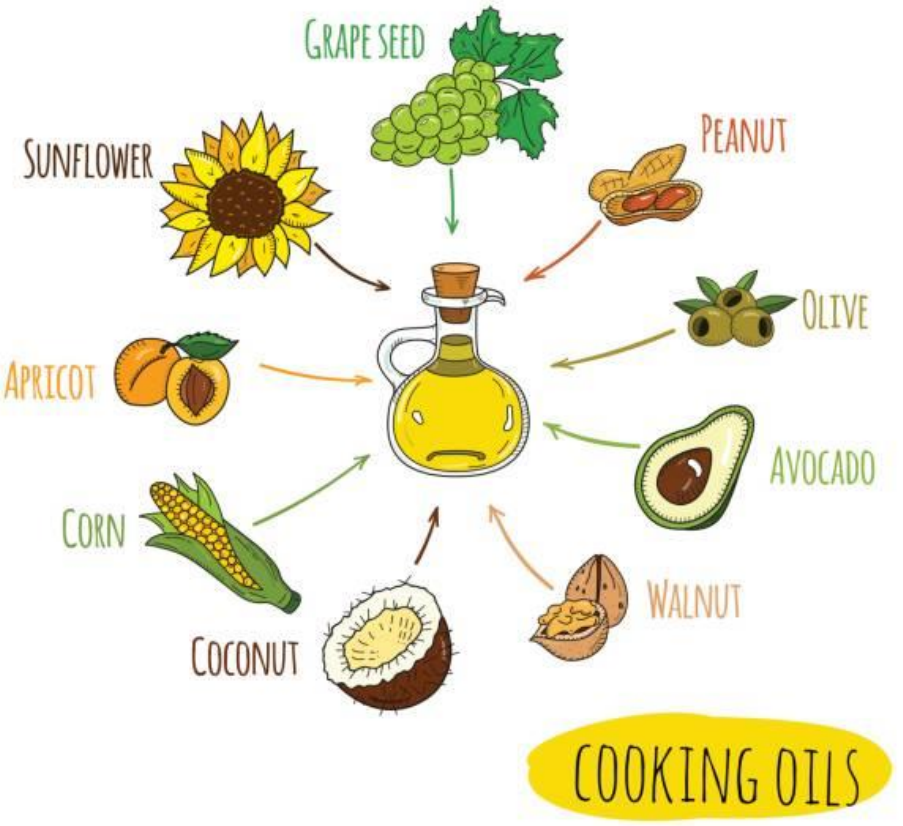
Drink enough water every day

- Drink 8–10 cups of water every day.
- Water is the **best choice**, but you can also consume other drinks, fruits and vegetables that contain water, for example lemon juice (diluted in water and unsweetened), tea and coffee.
- But be careful not to consume too much caffeine, and avoid sweetened fruit juices, syrups, fruit juice concentrates, fizzy and still drinks as they all contain sugar.



Eat moderate amounts of fat and oil

- Consume **unsaturated fats** (e.g. found in fish, avocado, nuts, olive oil, soy, canola, sunflower and corn oils) rather than **saturated fats** (e.g. found in fatty meat, butter, palm and coconut oils, cream, cheese, ghee and lard).



Eat moderate amounts of fat and oil

- Choose white meat (e.g. poultry) and fish, which are generally low in fat, rather than red meat.
- Avoid processed meats because they are high in fat and salt.

Eat moderate amounts of fat and oil

- Where possible, opt for low-fat or reduced-fat versions of milk and dairy products.

Eat moderate amounts of fat and oil

- Avoid industrially produced trans fats.
- These are often found in processed food, fast food, snack food, fried food, frozen pizza, pies, cookies, margarines and spreads.

Eat less salt and sugar

- When cooking and preparing food, limit the amount of salt and high-sodium condiments (e.g. soy sauce and fish sauce).
- Limit your daily salt intake to less than 5 g (approximately 1 teaspoon), and use iodized salt.

Eat less salt and sugar

- Avoid foods (e.g. snacks) that are high in salt and sugar.
- Limit your intake of soft drinks or sodas and other drinks that are high in sugar (e.g. fruit juices, fruit juice concentrates and syrups, flavoured milks and yogurt drinks).
- Choose fresh fruits instead of sweet snacks such as cookies, cakes and chocolate.

Avoid eating out

- Eat at home to reduce your rate of contact with other people and lower your chance of being exposed to COVID-19.
- We recommend maintaining a distance of at least 1 metre between yourself and anyone who is coughing or sneezing.
- That is not always possible in crowded social settings like restaurants and cafes.

Counselling and psychosocial support

- While proper nutrition and hydration improve health and immunity, they are not magic bullets.
- People living with chronic illnesses who have suspected or confirmed COVID-19 may need support with their mental health and diet to ensure they keep in good health.
- Seek counselling and psychosocial support from appropriately trained health care professionals and also community-based lay and peer counsellors.

Thanks and best regard…