NUTRITION + NTM

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April 29, 2023

NUTRITION + NTM - OVERVIEW

- Importance Of Nutrition – Why It Deserves Respect
- Diet Trends – Are They Right For You?
- Nutrition Guidelines – Calories, Carbohydrate, Fat, Protein
- A Little Extra Help – Appetite Stimulants, Tube-Feeding
- Dietary Supplements – A Little Is Good, A Lot Is *Not* Better

☞ IMPORTANCE OF NUTRITION
WHY IT DESERVES RESPECT

№ 1. GOOD NUTRITION = STRONG IMMUNITY

Reference: Oregon State University, Linus Pauling Institute, Micronutrient Information Center. (2023).

№ 1. GOOD NUTRITION = STRONG IMMUNITY

- The immune system constantly works to protect the body from:
  - infection
  - disease

№ 1. GOOD NUTRITION = STRONG IMMUNITY

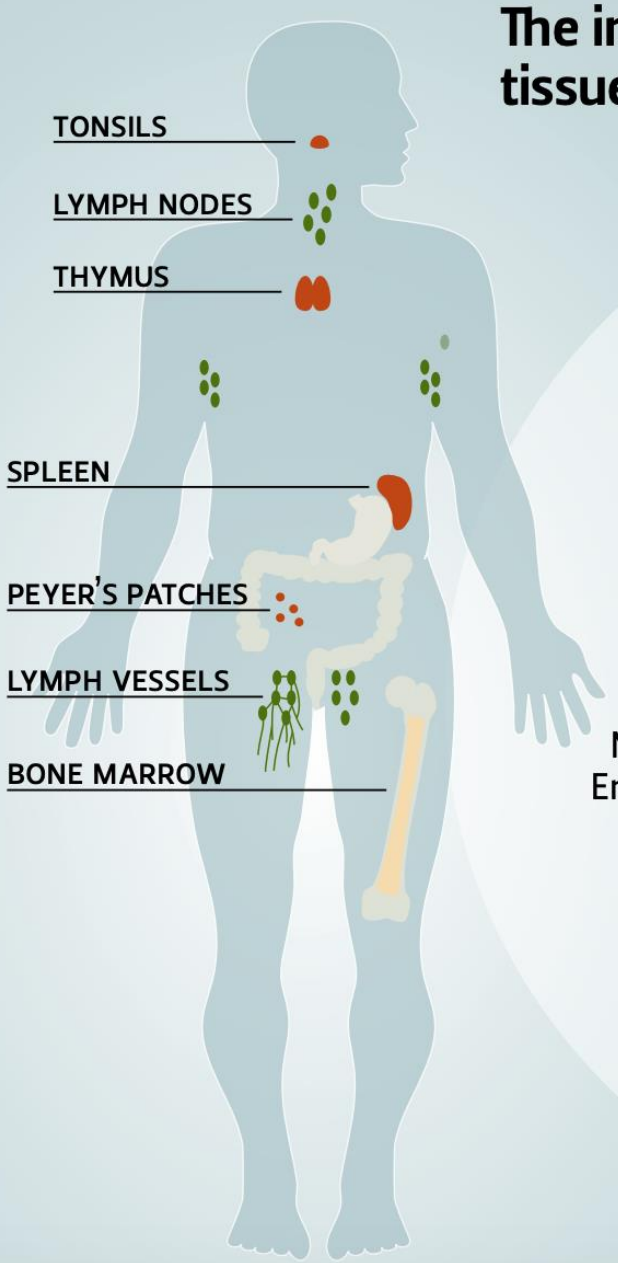
- The immune system relies on an adequate supply of nutrients for its baseline functions + ramping up activity when necessary.

№ 1. GOOD NUTRITION = STRONG IMMUNITY

- It is well established that malnutrition (inadequate calories and/or protein) and deficiencies in one or more essential minerals or vitamins diminish immune function.

OVERVIEW OF THE IMMUNE SYSTEM

The immune system consists of various organs, tissues, and cells located throughout the body.



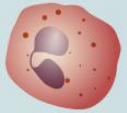
WHITE BLOOD CELLS (WBCs)

- The cells of the immune system
- Made inside bone marrow
- WBCs travel through the body inside lymph vessels, which are in close contact with the bloodstream

THERE ARE SEVERAL TYPES OF WBCs

NEUTROPHILS
Engulf & destroy

MONOCYTES
(MACROPHAGES)
Engulf & destroy



EOSINOPHILS
Fight parasitic infections

BASOPHILS
Release histamine

LYMPHOCYTES
Attack specific pathogens

PLASMA CELLS
Produce antibodies

OVERVIEW OF THE IMMUNE SYSTEM

The immune system provides three levels of defense against disease-causing organisms:

1

BARRIERS

Prevent entry

- Skin and mucus membranes
- Stomach acid and digestive enzymes
- Beneficial bacteria that live in the colon (the gut microbiota)

2

INNATE IMMUNITY

General defense

WBCs called neutrophils and macrophages engulf and destroy foreign invaders and damaged cells

3

ACQUIRED IMMUNITY

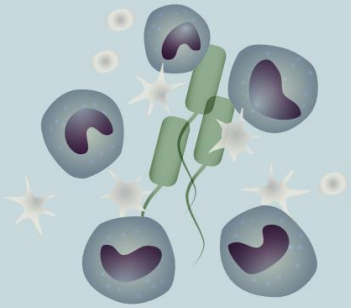
Specific defense

- WBCs called T lymphocytes (T cells) target and destroy infected or cancerous cells
- WBCs called B lymphocytes (B cells) and plasma cells produce antibodies that target and destroy infected or cancerous cells

IMMUNE SYSTEM – 3 KEY FEATURES

INFLAMMATION

- Isolates the injured or infected area
- Helps deliver immune cells, chemical messengers, and antibodies to sites of injury or infection



Important nutrients

- EPA
- DHA

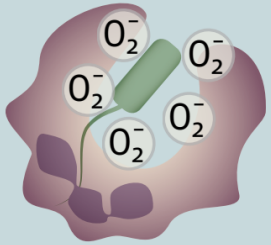
Connection

- Inappropriate activation or the inability to turn off inflammation can lead to tissue damage and chronic disease
- EPA and DHA have anti-inflammatory activity that can help keep inflammation in check

IMMUNE SYSTEM – 3 KEY FEATURES

OXIDATIVE BURST

- Certain immune cells produce a concentrated burst of reactive oxygen species (ROS), damaging substances that help kill invading organisms



Important nutrients

- Vitamin C
- Vitamin E
- Iron
- Zinc
- Copper
- Selenium

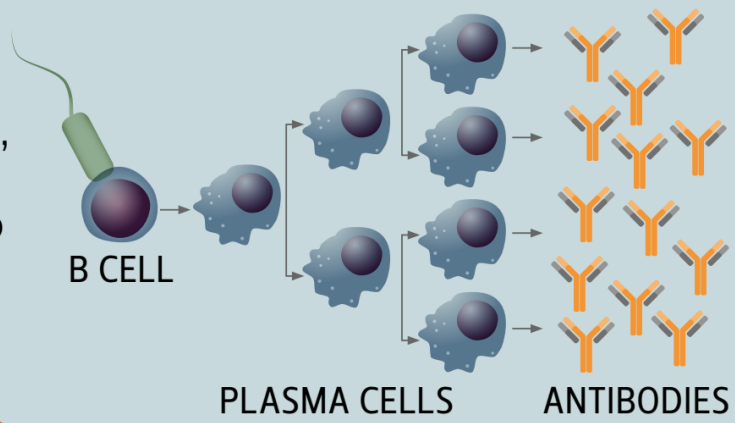
Connection

- Prolonged and continuous exposure to ROS can lead to damage and disease
- The listed antioxidant nutrients protect immune cells and keep the oxidative burst in check

IMMUNE SYSTEM – 3 KEY FEATURES

PROLIFERATION

- Refers to an increase in the number or amount of something
- The immune system is constantly producing cells, chemicals, and proteins to carry out its functions
- When it encounters a foreign invader, it ramps up production to respond as needed



Important nutrients

- Vitamin A
- Vitamin D
- Folate
- Vitamin B_{12}
- Vitamin B_6
- Iron
- Zinc

Connection

- Proliferation requires energy, building blocks, and cofactors to produce the many cells and substances needed to mount an effective immune response
- The listed micronutrients have essential roles in the production and development of all new cells in the body, including immune cells

№ 2. GOOD NUTRITION COMBATS WASTING

Reference: Jensen et al. (2010).

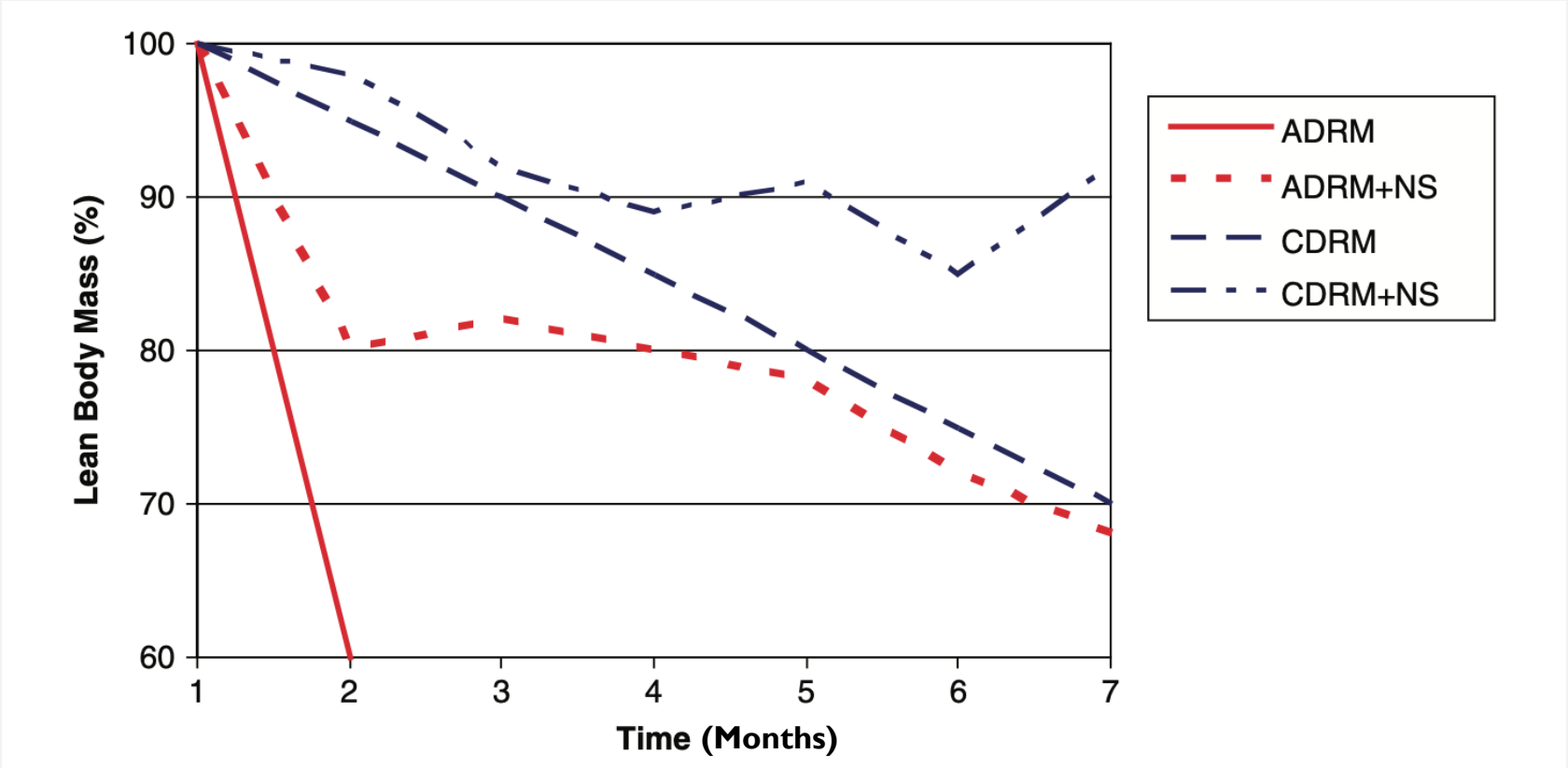
№ 2. GOOD NUTRITION COMBATS WASTING

- NTM is a consumptive condition. Inflammation causes wasting:
  - ↑ resting energy expenditure (↑ calories burned)
  - ↑ breakdown of *lean body mass*; loss of muscle mass + function may occur rapidly or slowly (cytokine-mediated)
  - ↑ protein excretion
  - ↓ appetite (cytokine-mediated)

№ 2. GOOD NUTRITION COMBATS WASTING

- The point at which the severity or persistence of inflammation results in a decrease in lean body mass associated with functional impairment is "disease-related malnutrition."

DISEASE-RELATED MALNUTRITION



ADRM - acute disease-related malnutrition
CDRM - chronic disease-related malnutrition

ADRM**+NS** - ADRM **with nutrition support**
CDRM**+NS** - CDRM **with nutrition support**

№ 3. LOW BMI = POOR OUTCOMES

Reference: Youssefnia et al. (2022).

BMI (BODY MASS INDEX) DEFINITION

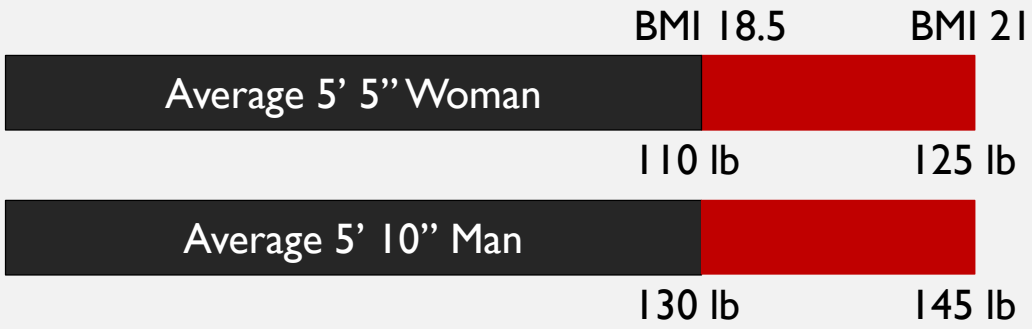
- BMI = [(weight in lb) / (height in inches)^2] x 703
  - Female: 5’ 4”, 100 lb
  - BMI = [(100 lb) / (64)^2] x 703 = 17.2 kg/m^2

№ 3. LOW BMI = POOR OUTCOMES

- Low BMI < 18.5 adversely effects outcomes:
  - ↑ disease progression
  - ↑ number of diseased lung segments
  - ↑ NTM-Lung Disease (NTM-LD) specific mortality
  - ↓ response to antibiotic therapy (anecdotal evidence)

GOAL WEIGHT FOR BMI ≥ 18.5

- Goal weight for 5’ 4” or 5’ 5” woman ≥ 110 lb
- Goal weight for 5’ 9” or 5’ 10” man ≥ 130 lb



BEWARE OF BODY IMAGE

- Preference for being thin
- Fear of getting fat
- Concern for gaining belly fat

 DIET TRENDS

ARE THEY RIGHT FOR YOU?

DIET TRENDS
ARE THEY RIGHT FOR YOU?

Healthy trends	Consider facts + needs with NTM
Drink 8-8oz glasses water	Limit plain water + hydrate with calorie beverages
A lot of fruits + vegetables	Adequate calories help maintain + restore healthy weight
Low-fat	A heart-healthy diet may be up to 40% good fats
No red meat	Extra protein helps to meet increased needs + prevent loss
No dairy	Dairy does not cause mucus, is not inflammatory + benefits > costs
No gluten	Gluten is not inflammatory + benefits > costs
No sugar	Some added sugar is okay + can be enjoyed sensibly.
Low-carb	Healthy grains/starches provide nutrients, energy + help build muscle

☞ NUTRITION GUIDELINES
CALORIES, CARBOHYDRATE, FAT, PROTEIN

NUTRITION GUIDELINES
CALORIES

- ADD vs. SUBTRACT
- Estimated calorie needs = 30% higher with NTM
- Goals = 2000+ calories/day (women); 2400+ calories/day (men)

NUTRITION GUIDELINES
PROTEIN

- ADD vs. SUBTRACT
- Estimated protein needs = 30% higher with NTM
- Goals = 60-90+ grams/day distributed evenly between meals

NUTRITION GUIDELINES
CARBOHYDRATES

- ADD vs. SUBTRACT
- Balance meals with bread, oatmeal, rice, pasta, potatoes
- Enjoy dessert

- *To manage blood sugars:*

Pick healthy carbs, limit portions, enjoy with mixed meals at middle or end of meals

NUTRITION GUIDELINES
FAT

- ADD vs. SUBTRACT
- A heart healthy Mediterranean-style diet may be up to 40% fat

- *To manage cholesterol:*

Pick unsaturated fats: avocado, canola oil, extra-virgin olive oil, fish/seafood, nuts/seeds

 A LITTLE EXTRA HELP
APPETITE STIMULANTS, TUBE-FEEDING

A LITTLE EXTRA HELP
APPETITE STIMULANTS

- Indications for appetite stimulant:
  - Poor appetite is a major barrier
  - Profound fatigue and decline
  - Weight restoration is essential

A LITTLE EXTRA HELP
APPETITE STIMULANTS

- Mirtazapine +/- Methylphenidate
- Megestrol
- Dronabinol

Reference: Lexicomp. (2023).

A LITTLE EXTRA HELP
APPETITE STIMULANTS

	Mirtazapine (Remeron®) *Antidepressant*
Side effects	↑ appetite, ↑ weight, ↑ mood, ↑ sleep ↑ sedation, tired, weak
Dosing	7.5 mg at bedtime to start, ↑ to 15-30 mg
Administration	Without regard to meals
Mechanism of Action	Interacts with central mechanisms regulating appetite + intake

A LITTLE EXTRA HELP
APPETITE STIMULANTS

Mirtazapine (Remeron®) +/- Methylphenidate (Ritalin®) *Antidepressant +/- Central Nervous System Stimulant*	
Side effects	↑ appetite/weight, ↑ mood, ↑ sleep, ↑ energy
Dosing	7.5 mg at bedtime to start, ↑ to 15-30 mg 2.5 mg twice daily (8am, 12pm), ↑ 5 mg
Administration	Without regard to meals Take at 8am, 12pm
Mechanism of Action	Interacts with central mechanisms regulating appetite + intake Mildly stimulates central nervous system

A LITTLE EXTRA HELP
APPETITE STIMULANTS

	Megestrol (Megace®) *Appetite Stimulant*
Side effects	↑ appetite, ↑ weight ↑ dizziness, passing out ↓ energy + strength
Dosing - Avoid use in older patients	↑ risk of clots
Mechanism of Action	May antagonize metabolic effects of inflammatory cytokines

A LITTLE EXTRA HELP
APPETITE STIMULANTS

	Dronabinol (Marinol®) *Appetite Stimulant*
Side effects	↑ appetite, ↑ weight, mind-altering
Dosing - Avoid use	Cost prohibitive, Poor insurance coverage, Less effective than other options
Mechanism of Action	Activates cannabinoid receptors CB1, CB2

A LITTLE EXTRA HELP
TUBE-FEEDING

- IF efforts to restore weight with oral intake, high-calorie shakes, and appetite stimulant(s) are not successful,
- THEN tube-feeding may be considered.

DIETARY SUPPLEMENTS
A LITTLE IS GOOD, A LOT IS *NOT* BETTER

DIETARY SUPPLEMENTS
A LITTLE IS GOOD, A LOT IS *NOT* BETTER

- Daily multimineral/multivitamin, iron-free
- Calcium + vitamin D
- Vitamin C
- Zinc

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THANK YOU!