The Healthy Gut-Brain: Attenuate Aging Symptoms via Nutritional Sufficiency

Created & Presented *exclusively* for
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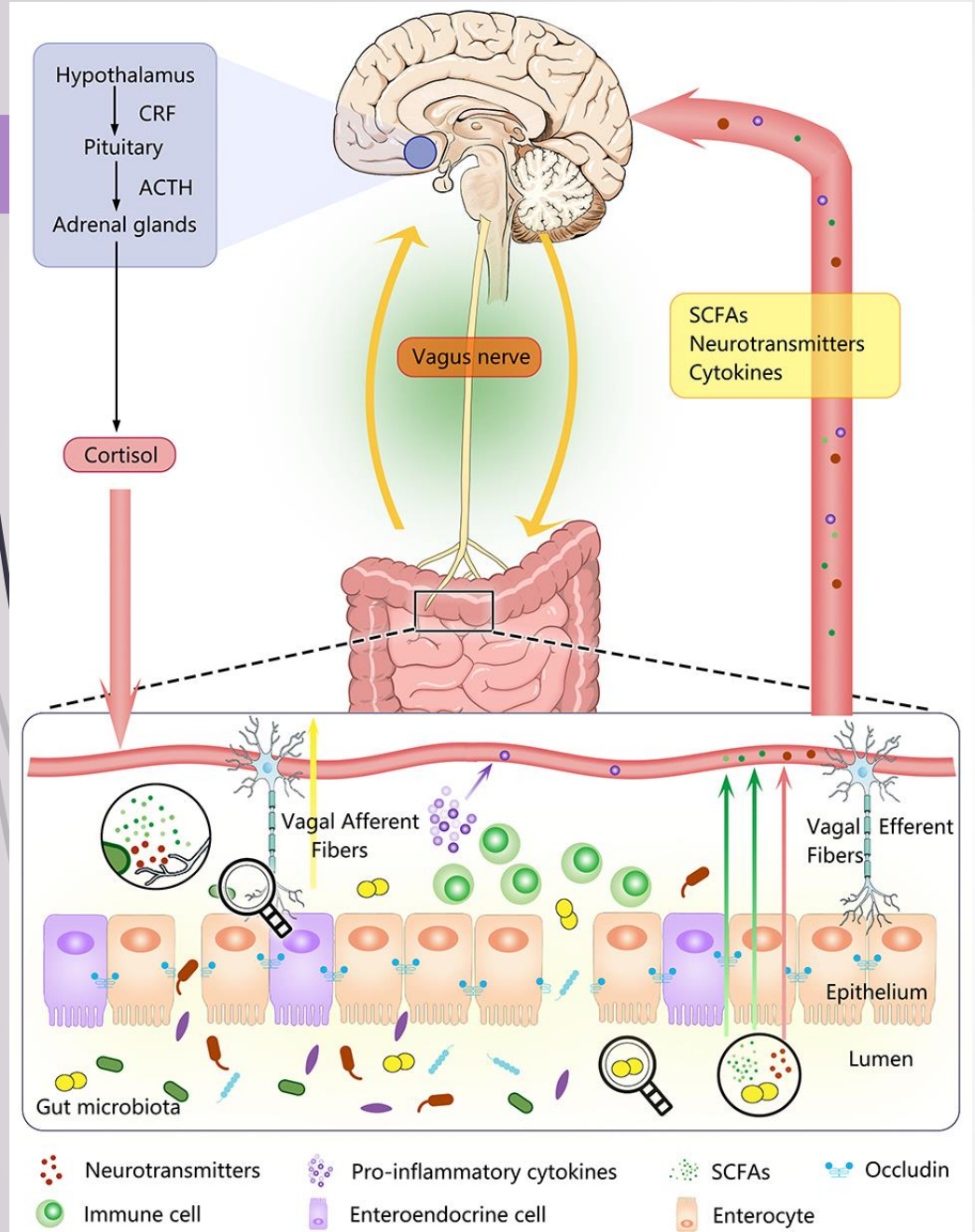
Breaking News …
Guts & Brains "Communicate!"

- When any part of our body receives a stimulus, nerves respond and activate appropriate body system(s) via electrical signals.
- Post response(s), the body is once again at rest.
- Specifically, when the gut and the brain are needed, the vagus nerve (connecting these two systems) is activated via electrical signaling.
- The vagus nerve conveys bi-directional signaling to activate various chemical pathways within the hypothalamic-pituitary-adrenal (HPA) axis.
- Healthy/appropriate HPA function depends on individualized/optimal nutrition.



GUT-BRAIN LINK

Vagus Nerve Functions

1. Routes signals from the gut (and other organ systems) to the brain AND
2. Routes signals from the brain to the gut (and other organ systems.)

The Gut – Brain Connection

Nutrients & Metabolites

Vagus Nerve

Nutrients & Metabolites

Why *is* Nutritional Sufficiency Important?

- We eat food and drink beverages.
- These substances are broken down (metabolized), used by our body systems to repair, grow, defend and sustain our health.
- Without nutritional sufficiency, our bodies become inflamed, i.e., do not thrive, repairs slow down and/or complete responsiveness is compromised – inflammation.
- Inflammation results in chronic physical disabilities and/or physiological diseases.
- Inflammation increases risks of co-morbidity(ies) and/or early mortality.

MULTI-FACTORIAL

Human Aging – Multifactorial

I). Causes

- Environmental
- Organismic
- Inter- & Intra-system
- Cellular

II). Risk Factors

- Chronic Diseases
- Chronic Disabilities
- Individualized Choices

III. Mitigating Elements

- Nutrition
- Exercise
- Behavioral Change

Human Aging – Multifactorial

I. Causes (Ferrucci, et al, (2019, Harran & McCormick, 2021) – organismic, systemic, microcellular

- Environmental
  - Nutrigenomics – environmental impact on one's genetic genotype → phenotype;
- Organismic
  - Cellular aging,
  - Nutrigenetics – genotype on nutrition;
- Systemic
  - Intra – within an organ system,
  - Inter – involving more than one system;
- Cellular Aging
  - Mutations,
  - Telomere length,
  - Mitochondrial dysfunction.

INFLAMMATION?

Human Aging – Multifactorial

INFLAMMATION?

II. Risk Factors

- Diseases – cancer, CVD;
- Disabilities – body composition, malnutrition, genetic conditions & aging (Riddle, Stipanuk & Thalacker-Mercer, 2016).
- Individualized Choices
  - "Involuntary" – circumstances (upbringing, SES, mis-information, lack of information, persistent ethnic, religious beliefs & practices).
  - "Voluntary" – choices of daily & *routine* physical activities, evidence-based nutritional intake.

Human Aging – Multifactorial

While an individual's aging progression is multi-factorial, there *may* be ways to "S L O W" down the process –

III. Mitigating Elements

- Nutrition
- Exercise
- Behavioral Change

INFLAMMATION?

Is Inflammation a Good Body Response?

Generally, Yes!

Our bodies

Fight!

Is Inflammation a Bad Response?

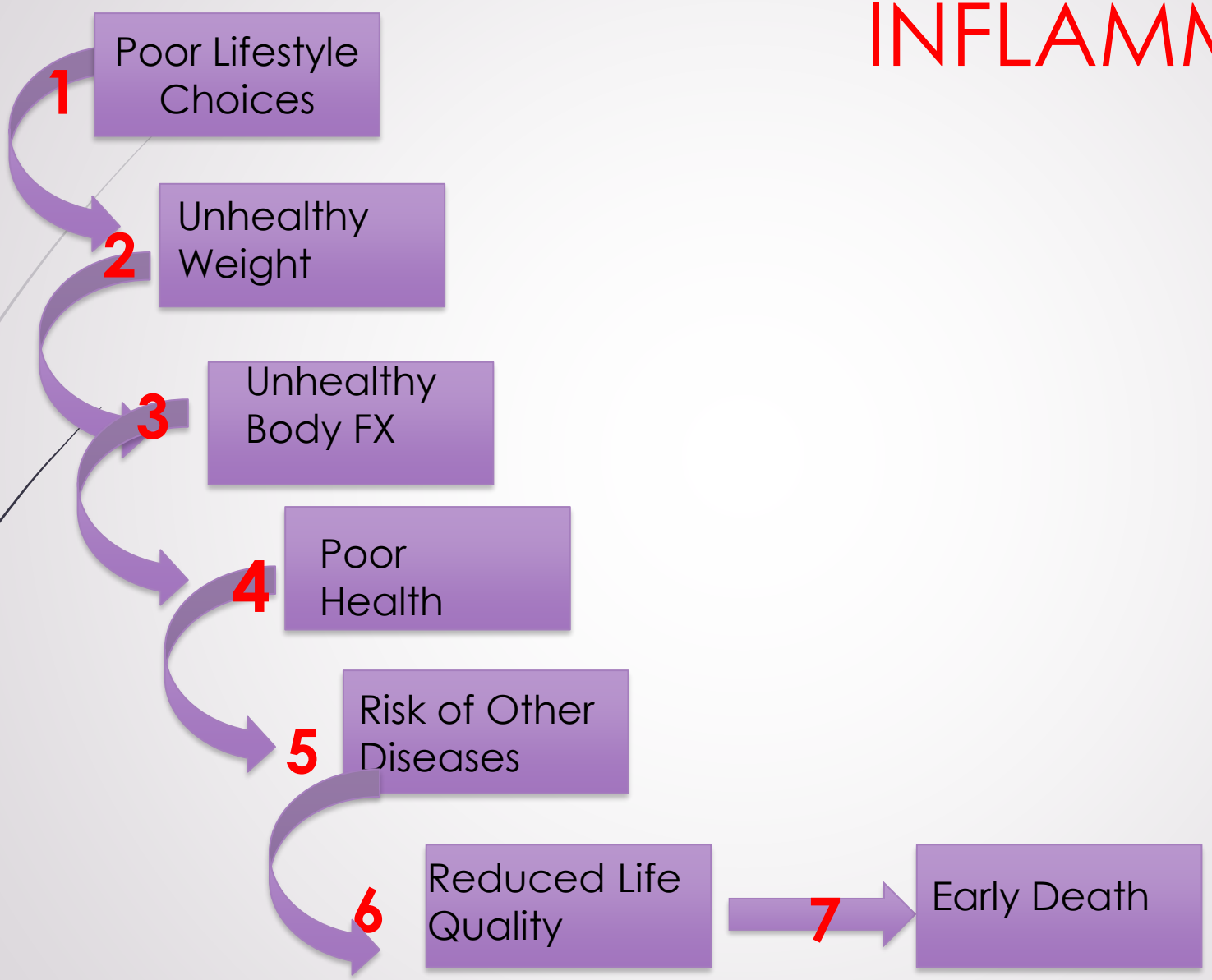
Yes!

When

Inflammation Goes

Unchecked!!!

INFLAMMATION




UNCHECKED
INFLAMMATION

But, what can NUTRITION do?

First … What about?

Routine Physical Activity

- Discretionary $$$;
- Independence;
- Mental agility;
- Emotional mood;
- Functional abilities.

Favorable Behavioral Changes

- Self-efficacy;
- Sustainability;
- Social interaction;
- Eagerness.

Lack of *routine* physical activity (Buchman et al., 2012) and/or poor management of mental health (anxiety, depression, social isolation) increase progression of poor health Holt-Lunstad J., & Smith T. B. (2016).

What is GOOD Nutrition?

GOOD nutrition consists of eating foods as found in *nature* with

- high nutrient *density;*
- no adulteration (*added* salt, sugar & fats, preservatives & fillers);
- minimal factory manipulation;
- free of preservatives, unnatural additives;
- cooked appropriately;
- prepared at home.

Adequate, balanced, calorie *sufficient*.

Nutrients

- Macronutrients
  - Carbohydrates
  - Fats
  - Proteins
- Micronutrients
  - Vitamins
  - Minerals
  - Water

The Six Nutrients*

- Carbohydrates – primary source of energy, especially the brain:
  - Simple and complex;
  - Soluble & insoluble fiber;
  - Fruit, starches, legumes.
- Fats – secondary source of energy (adipose/subcutaneous & visceral):
  - Saturated, PUFA, MUFA;
  - Animal fats, nuts, animal & poultry products.
- Proteins – combinations of amino acids for body substances:
  - Essential & non-essential;
  - Base units combined into enzymes, hormones, cells, tissues, blood.
- Vitamins – bodily functions & metabolic processes.
  - B_1, B_2, B_3, B_6, B_{12}, biotin, folate, pantothenic acid & C (water soluble);
  - A, D, E & K (fat soluble).
- Minerals – homeostasis, body processes & physiological systems maintenance.
  - Calcium, potassium, chloride, phosphorous, magnesium, iron, zinc.
- Water – homeostasis, waste & nutrient transport.

* Most of what we consume contain ALL six nutrients.

Colorful Phytochemicals disease preventative, anti-inflammatory (Asaduzzaman, M.D., & Asao, T., 2018)

- Red anthocyanins & lycopene (beets, tomatoes, red cabbage, red bell peppers);
- Orange carotenoids, naringenin (carrots, pumpkin, squash, oranges);
- Yellow carotenoids & beta-carotene (squash, cantaloupe, carrots, mangoes, nectarines);
- Green chlorophyll (lettuces, zucchini, broccoli, melons, parsley);
- Blue/Purple anthocyanins (blueberries, wine, blackberries, eggplants);
- White allicin (onions, leeks, garlic).

NOTE: **SOME** phytochemicals have antioxidant properties (garlic, dark chocolate, coffee, kale, artichokes, curcumin, cinnamon).

Phytochemicals*

*Not all phytochemicals have colors visible to the human eye.

So, What are Anti-inflammatory Substances ?

CATEGORY	MECHANISM OF ACTION
CARBOHYDRATES • soluble & insoluble fibers, whole grains; • fruit & vegetables.	CARBOHYDRATES • aid cardiovascular & digestive systems; • anti-inflammatory.
FATS – omega-3 fatty acids (EPA & DHA) • salmon, mackerel, tuna, herring, and sardines, chia seeds, avocados.	FATS – omega-3 fatty acids • membrane fluidity, gene expression changes, cell membrane protection.
PROTEINS • legumes/beans: lentils, chickpeas, adzuki beans; • tempeh, tofu, peas, protein-based meat substitutes; • lean animal & poultry products & by-products.	PROTEINS • amino acids form anti-inflammatory substances to enhance immunity, cellular repair; • maintains intestinal tract microbial barrier & inflammation (potential inflammatory bowel & extra-intestinal autoimmune diseases, obesity& metabolic disorders.

So, What are Anti-inflammatory Substances (cont'd ?)

CATEGORY	MECHANISM OF ACTION
VITAMINS • fruit & vegetables (water-soluble B_1, B_2, B_3, B_6, B_{12}, biotin, folate, pantothenic acid & C); • fruit & vegetables (all fat soluble A, D, E & K).	VITAMINS • B vitamins in homocysteine metabolism (heart health) & gene expression, optimizing metabolism; • C – mediate inflammatory diseases via down-regulation of inflammatory markers, free radical scavenger; • A – free radical scavenger; • E – free radical scavenger.
PHYTOCHEMICALS (phenolic acids, flavonoids, tannins, carotenoids, isoflavones, sterols, lignans) • fruits & vegetables of the "rainbow;" • garlic, ginger, onions; • curcumin, turmeric, black pepper, clove, sumac, oregano; • thyme, peppermint, rosemary, oregano; • dark chocolate, wine, seeds, nuts.	PHYTOCHEMICALS • Produce enzyme activity that reduces inflammatory response.

Nutrients vs. Dietary Supplements (USDA, 2022)

Nutrients – based upon *evidence*. Nutrients are substances that the human body requires to grow, repair and/or maintain health.

- Macronutrients – Acceptable Macronutrient Distribution Range (AMDR);
- Micronutrients – four categories (RDA, AI, UL);
- Types pf nutrients (essential & non-essential).

Supplements – 50,000-80,000 *unregulated* "nutritional supplements:" Supplements are not regulated because there is insufficient evidence to link a causal relationship. Lack of regulation means that there is no control over ingredient source, purity, dosing and potential for human harm,

- Nutraceuticals;
- Prebiotics & probiotics;
- Vitamins and minerals;
- Single/multiple botanicals & herbs (echinacea, ginger, ginseng);
- Botanical compounds (C and iron, curcumin/black pepper);
- Amino acids (tryptophan, glutamine, BCAA's).

The Mediterranean Diet

- MAIN PORTIONS
  - Fruits and vegetables.
  - Whole grains, nuts, seeds and legumes.
  - Non-fat or low-fat dairy.
  - Fish, lean meats, tofu, lean poultry.
  - Eggs.
- MINOR PORTIONS
  - Vegetable oils (olive, coconut, safflower and sunflower).
  - Fish, lean meats and lean poultry.
  - Eggs.
  - Sweets.









We
Love
Plants

At *any* moment, is there a limit to one's bodily resources?

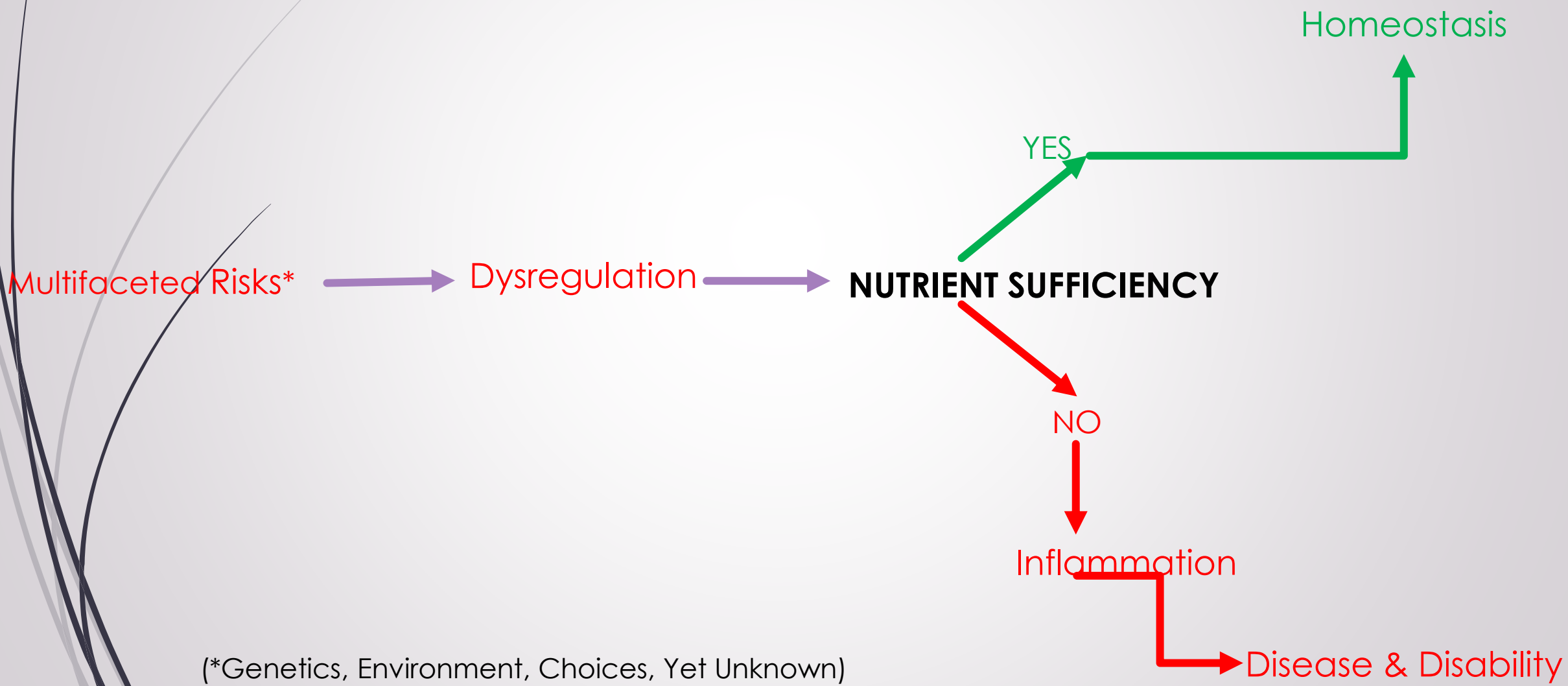
Yes, Resources *are* Limited!!!

Homeostasis – bodily systems' responses to maintain healthy ranges to maintain *health*;

Resources – building blocks of biochemical substances needed to maintain homeostasis;

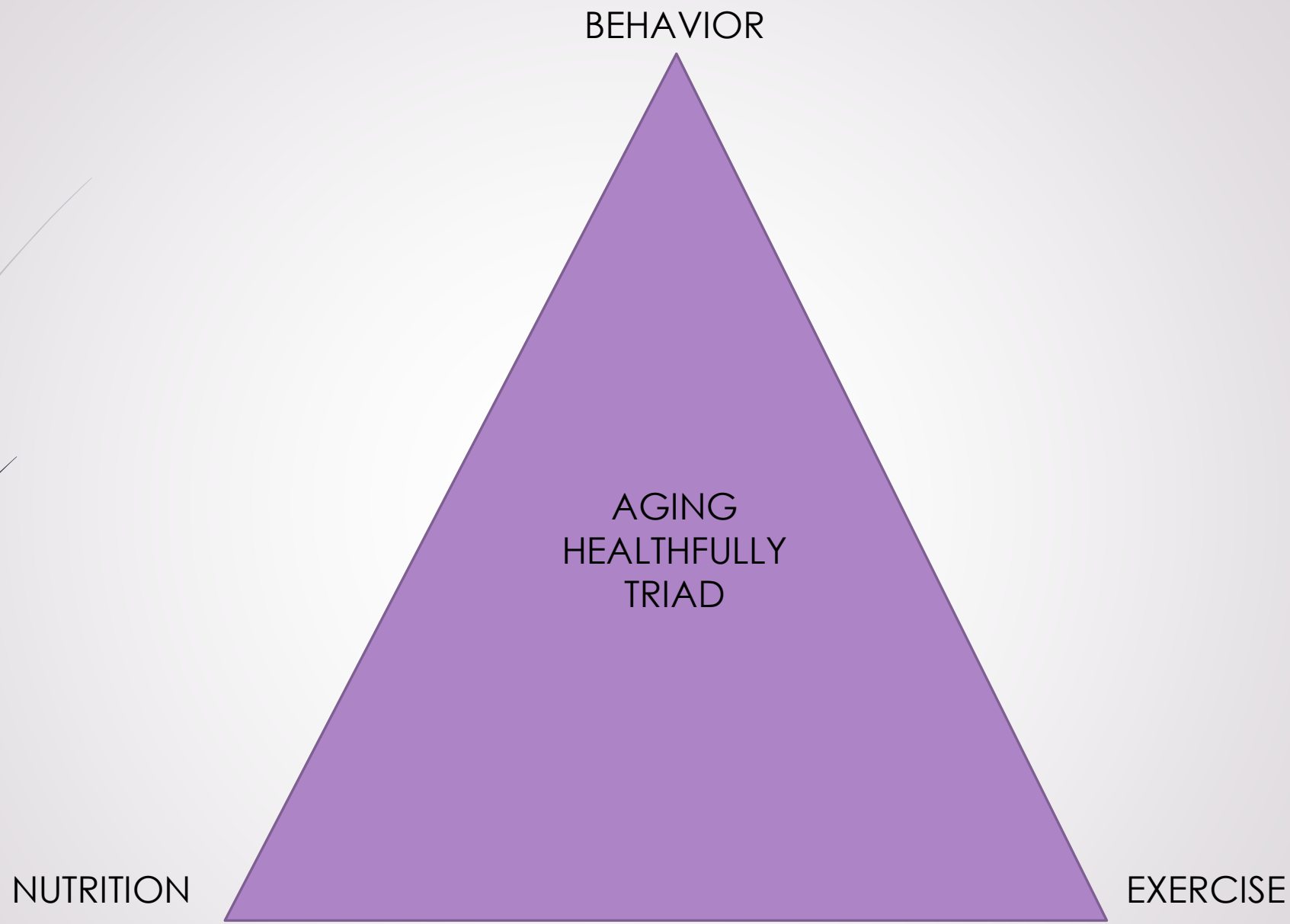
Inflammation – symptom(s) of body's inability to regulate.

Schematic – Sufficiency vs Insufficiency



(*Genetics, Environment, Choices, Yet Unknown)

Nutrition
One Leg of the
"Aging Healthfully"
Triad

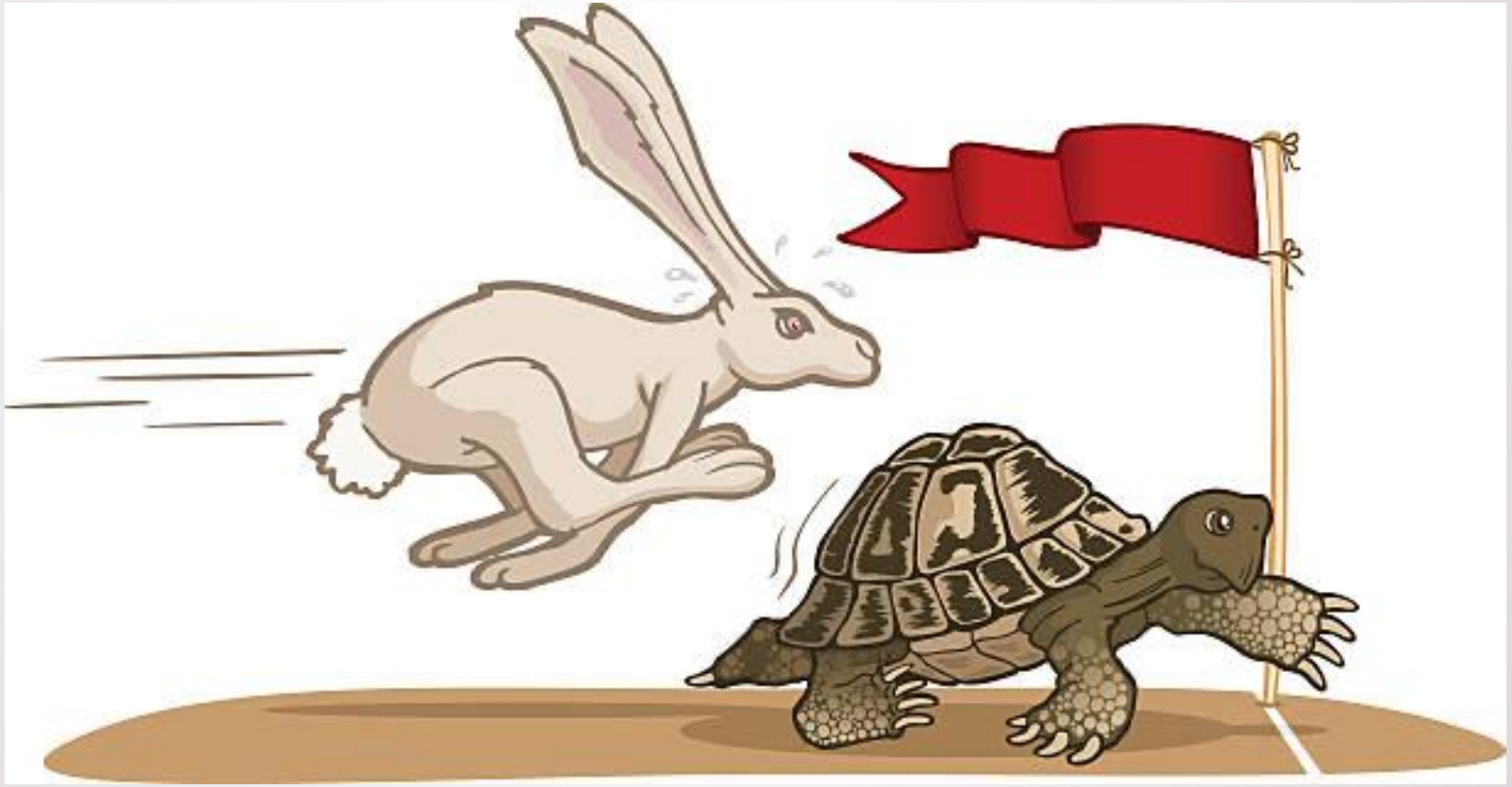

BEHAVIOR
AGING
HEALTHFULLY
TRIAD
NUTRITION
EXERCISE

Aging Healthfully Triad

MUST be FULLY INTEGRATED

- Behavior – proper balance of *available* biochemical substances(metabolites) to retard, maintain and enhance psychological equanimity.
- Nutrition – adequate, balanced and calorically sufficiency for immediate use and storage when homeostatic mechanisms are functioning below requirement.
- Exercise – maintain ratio of fat:fat-free mass for physiological wellness and decreased progression/severity of chronic diseases/disabilities.

Successful & Permanent Behavioral Change



In a Nutshell

1. Choose COLOR! Fruit/veggies.
2. Select 80% fresh – no labels!
3. Use herbs (basil, cilantro, rosemary).
4. Use spices (turmeric, cinnamon, pepper, chili powder).
5. Add ginger, onions, leeks, garlic.
6. Sub animal protein w/ legumes.
7. 2/3 plate with plants.
8. Plan meal around PLANTS!
9. Cook with olive or coconut oils.
10. Eat 70%+ dark chocolate.
11. Eat nuts, sprinkle on main dishes.
12. "Hara hachi bu!"
13. Try different cuisines!
14. Shop store's periphery & when *not hungry*.
15. Use smaller plates & utensils.
16. Get the "elephant" out of the room!
17. Substitute *g r a d u a l l y*.
18. Choose a "meatless" dinner each week.
19. Savor the process – chew w/ intention!
20. Choose nutrient density.
21. Get enough fiber!
22. Add texture, crunch, high aromatics.
23. Batch shop, prep, cook & store.
24. Before you eat, pack 50% *now* "to-go!"
25. Give yourself an "Atta!!!"
26. Drink water … and lots of it.
27. 2/3 plate with lots of COLOR!

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