

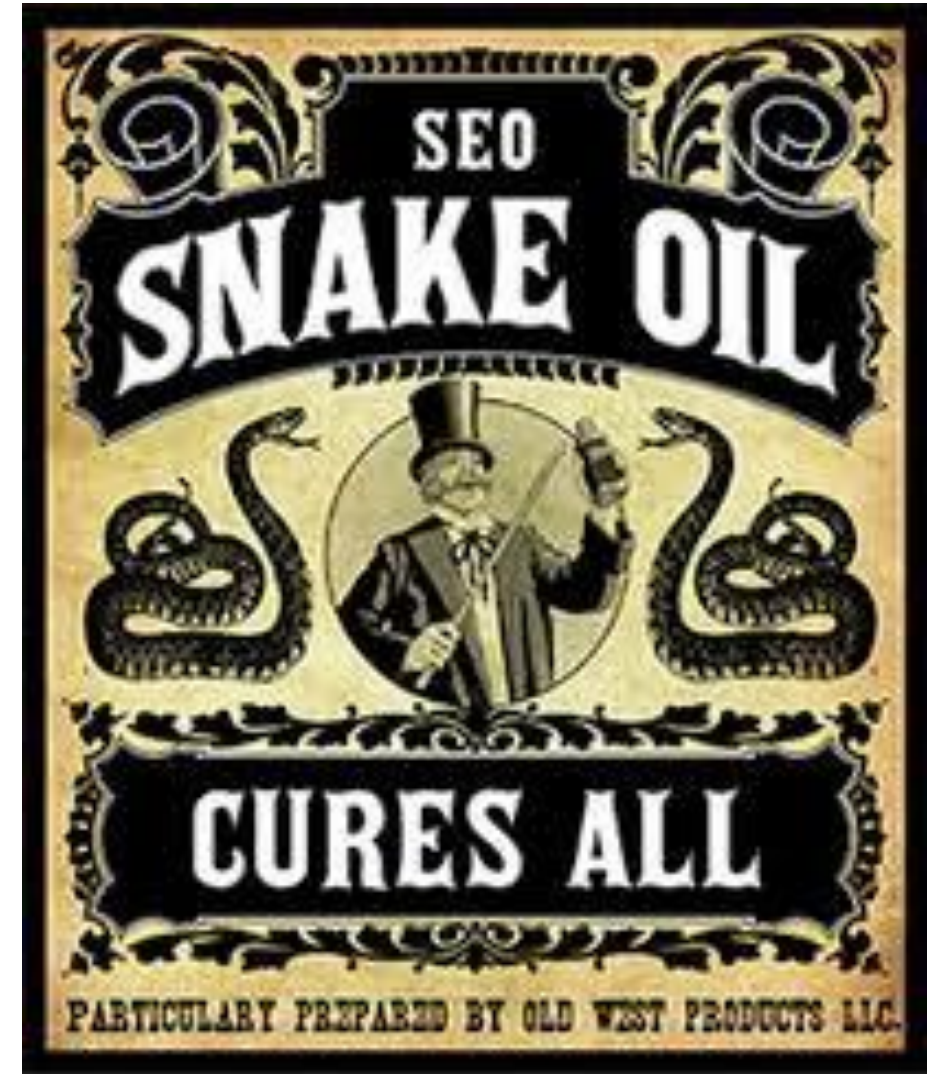
Optimize Your Immune System and Lower Risk of Getting Sick

www.drmarcmilstein.com

Be Wary of “Treatments” or “Cures”



Emails with bogus advice like “Drink water every 15 minutes....”



3 Goals for Today.

1. Accurate information

2. Empower with
actionable tips

3. ?????

Is It All About Vitamin C or Supplements?



Does Exercise Lower My Immune System?



Does Alcohol Boost or Suppress The Immune System? Virtual Happy Hour?



Crash Course On Your Immune System

Immune System Protects You From

Bacteria

Cancer

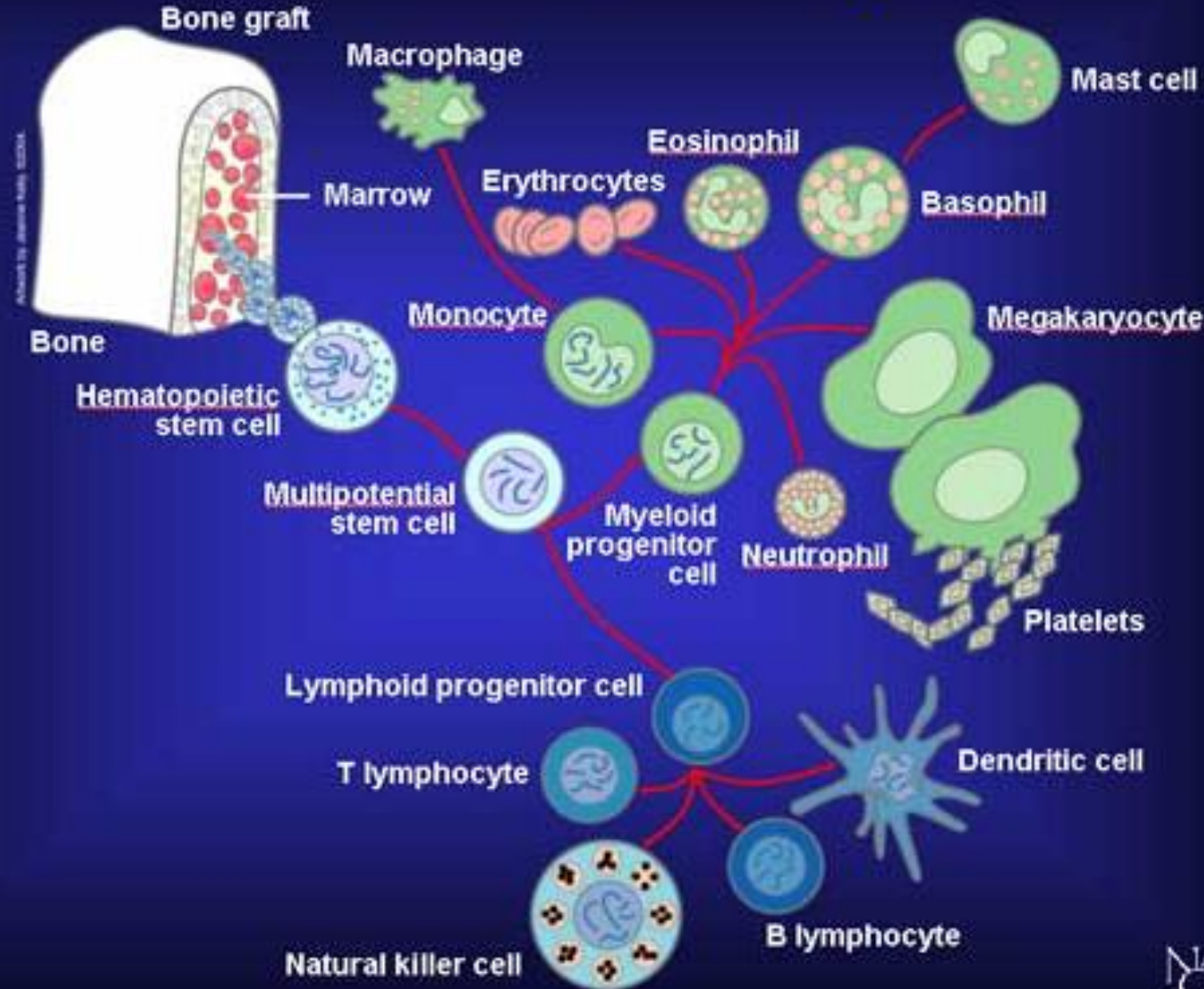
Viruses

(Anything That Isn't You)



The Immune System Is Complex
SO MANY PLAYERS

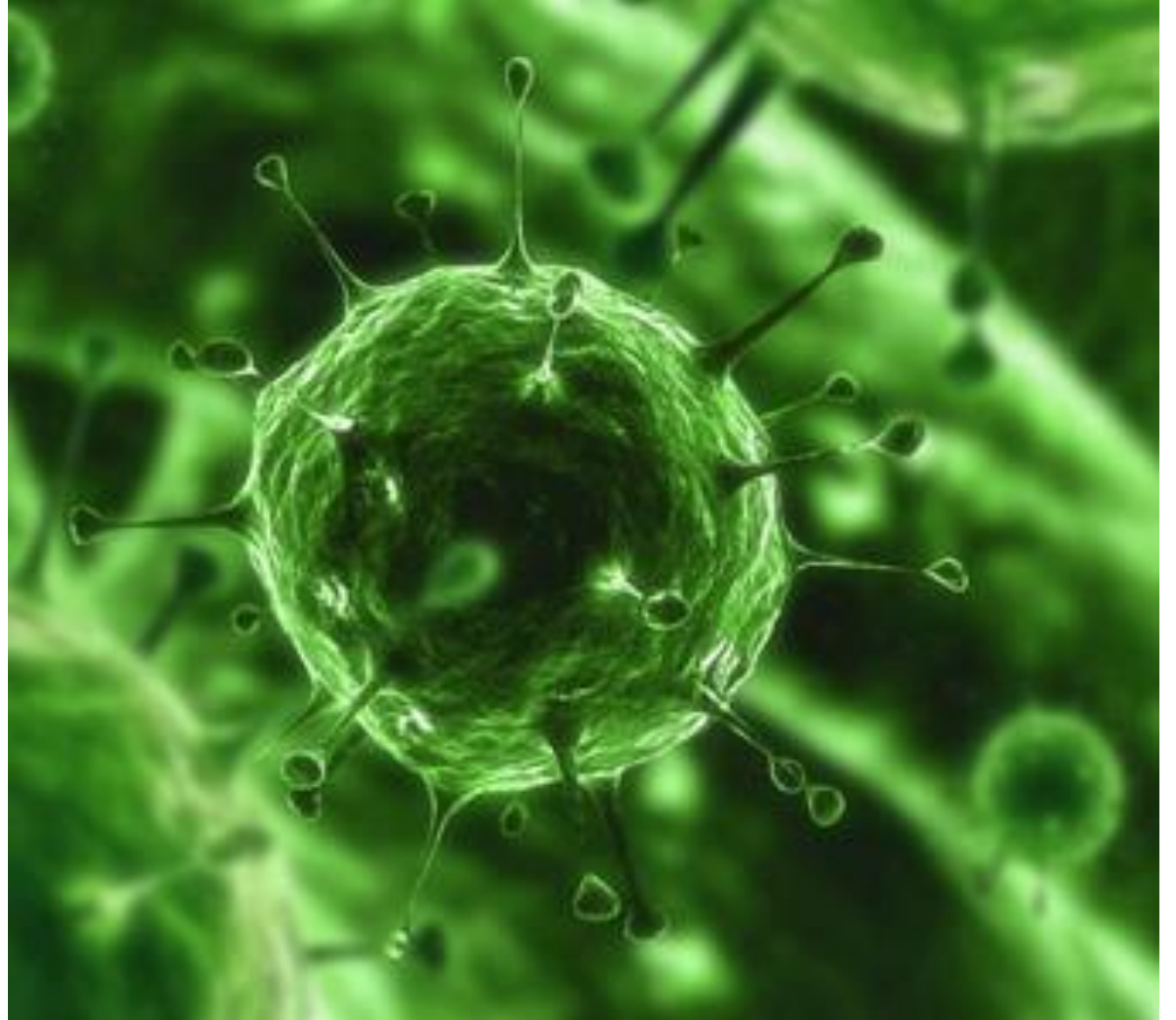
Cells of the Immune System



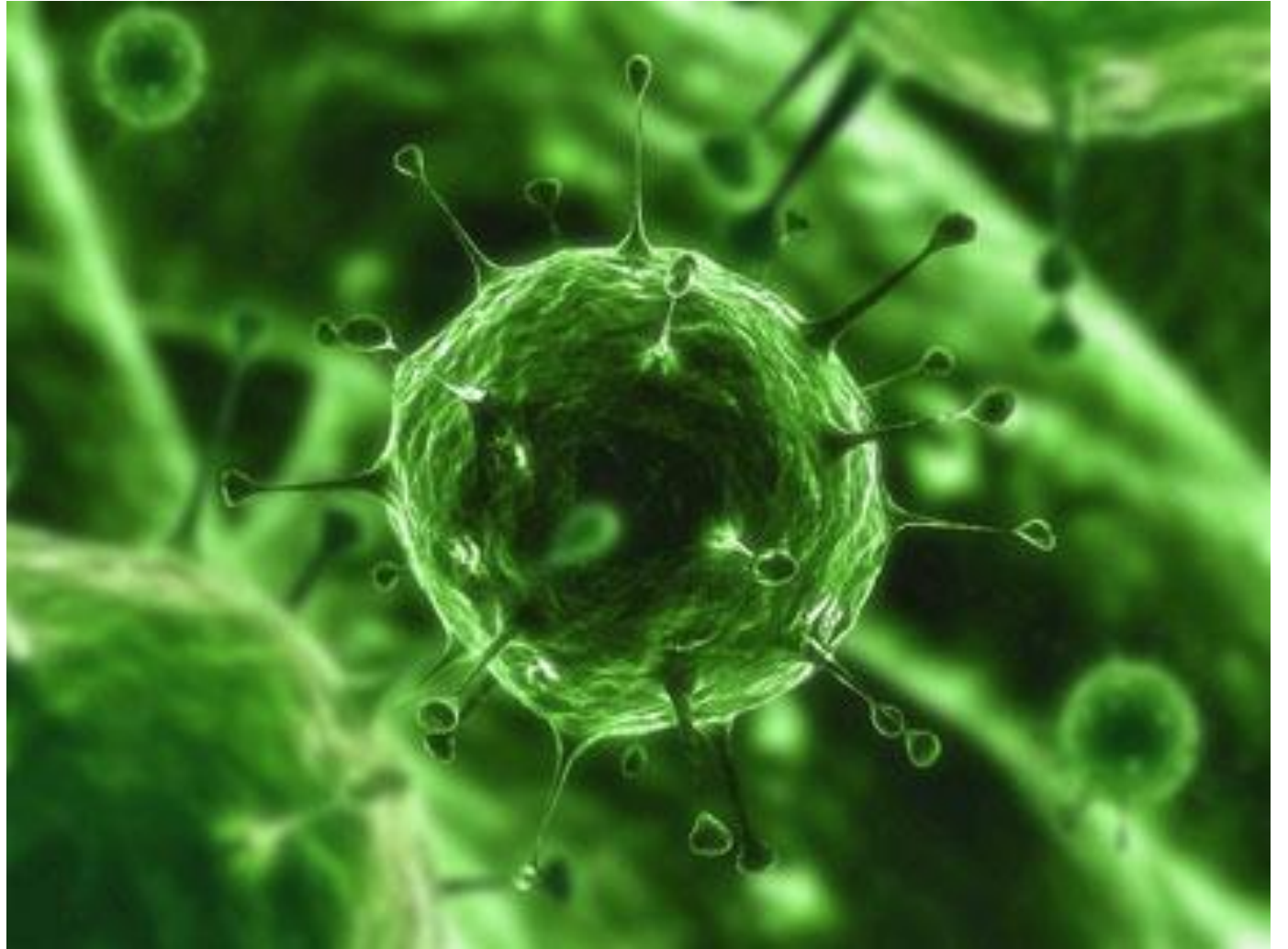
© 2000-2007 Ingenuity Systems, Inc. All rights reserved.

What is a Virus?

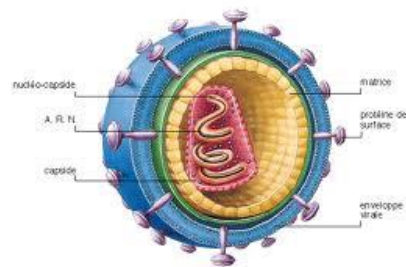
- A **virus** is a small infectious agent that can replicate only inside the living cells of organisms.
- Viruses infect all types of organisms, from animals and plants to bacteria.



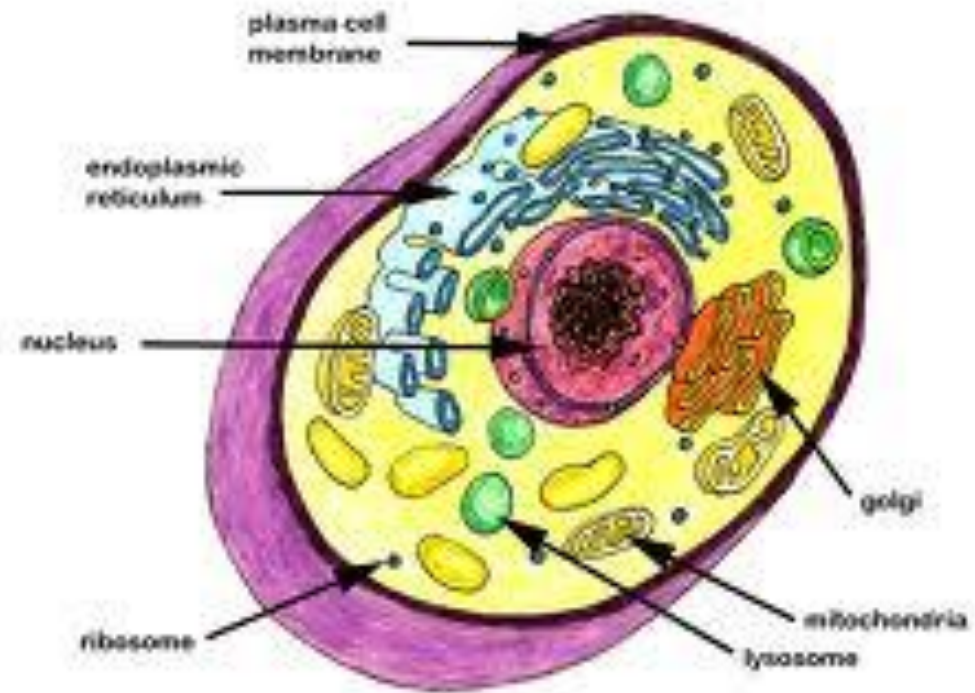
How Big Is A Virus?



In General A Virus Is 1/100 to 1/1000 The Size
Of One Of Your Cells

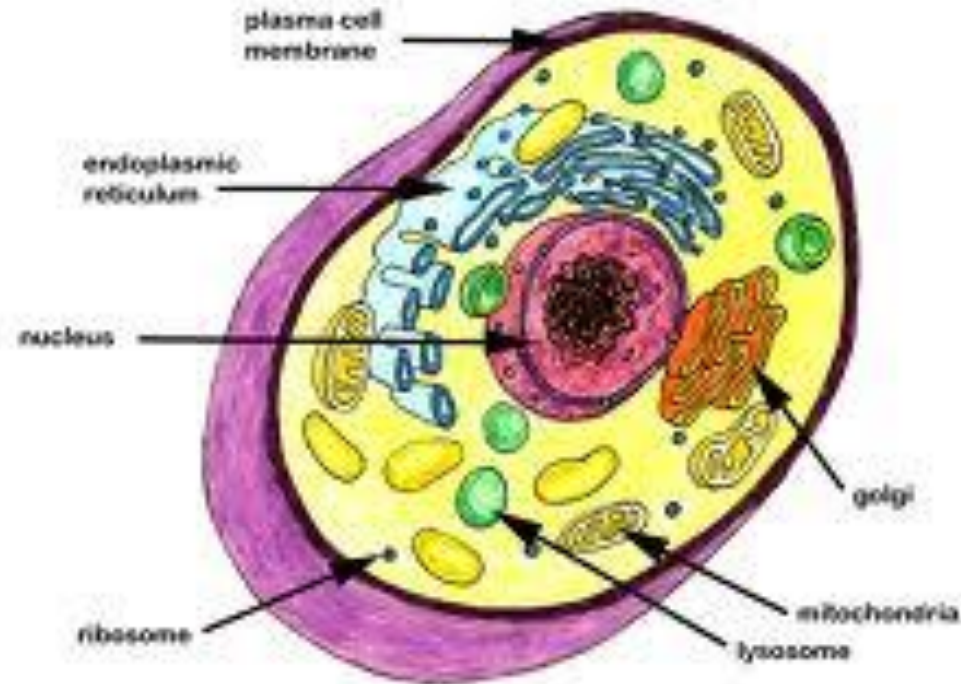


A single virus



A single cell

How Big Is One Of Your Cells?



**The average human cell is about 10 -15 micrometres
(μm)**

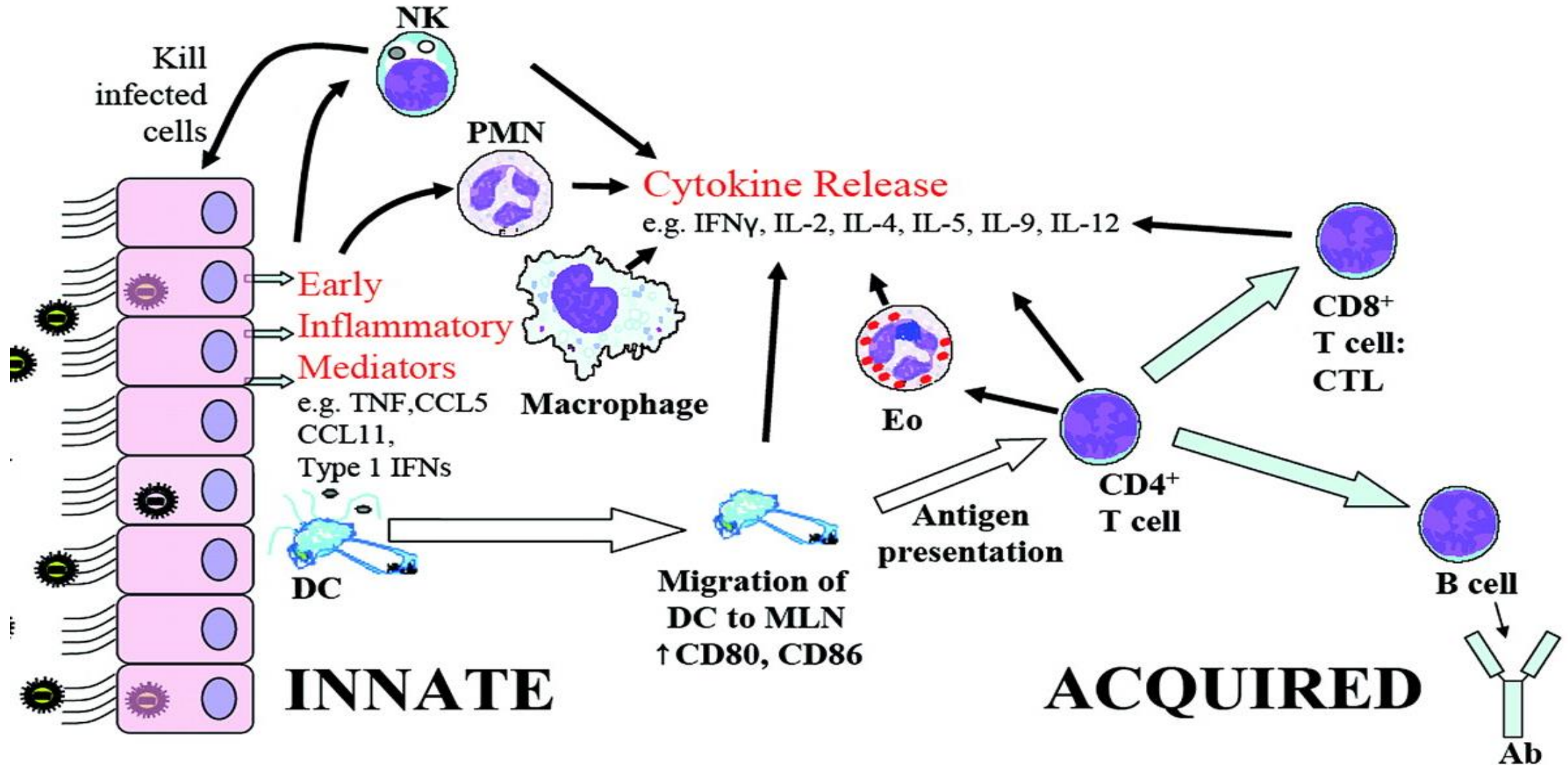
BUT HOW BIG IS THAT?????

**64,000 Red Blood Cells Could Fit On The Head
On The Head Of A Pin**



Or about 10,000 skin cells.

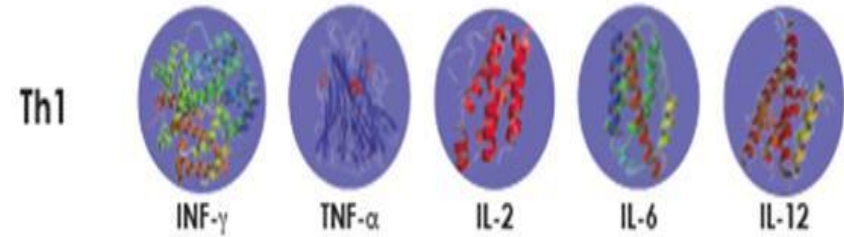
The Immune Response: The Cytokines and the T Cells



Two Important Players:

1. Cytokines: The Security Guards

Pro-inflammatory Cytokines : stimulate the immune system



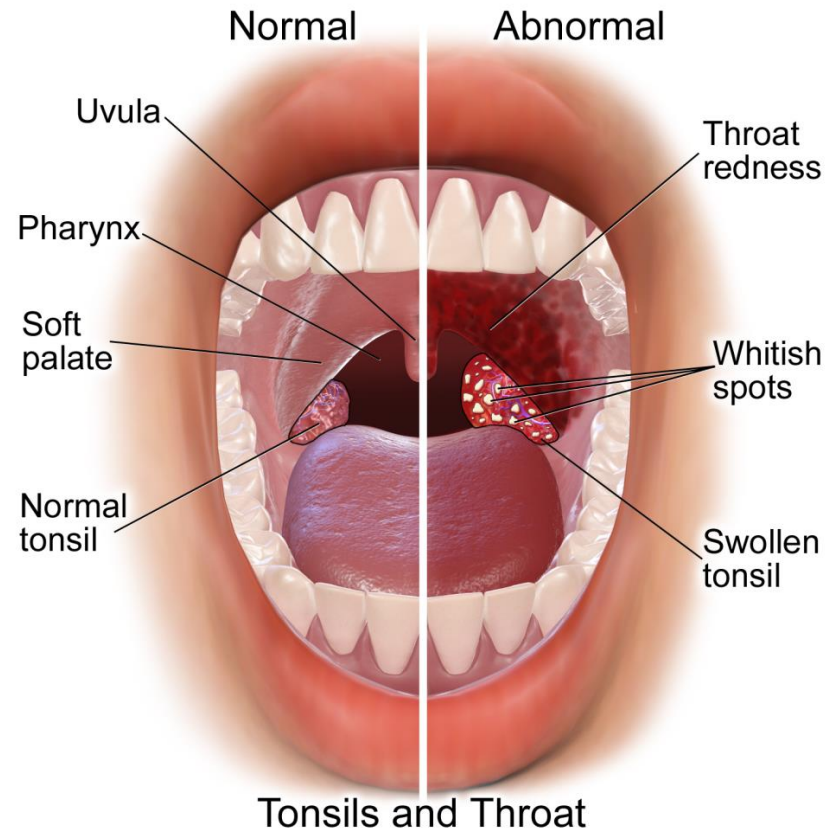
Pro Inflammatory Cytokines Stimulate The Killers (T-Cells)



Cytokines

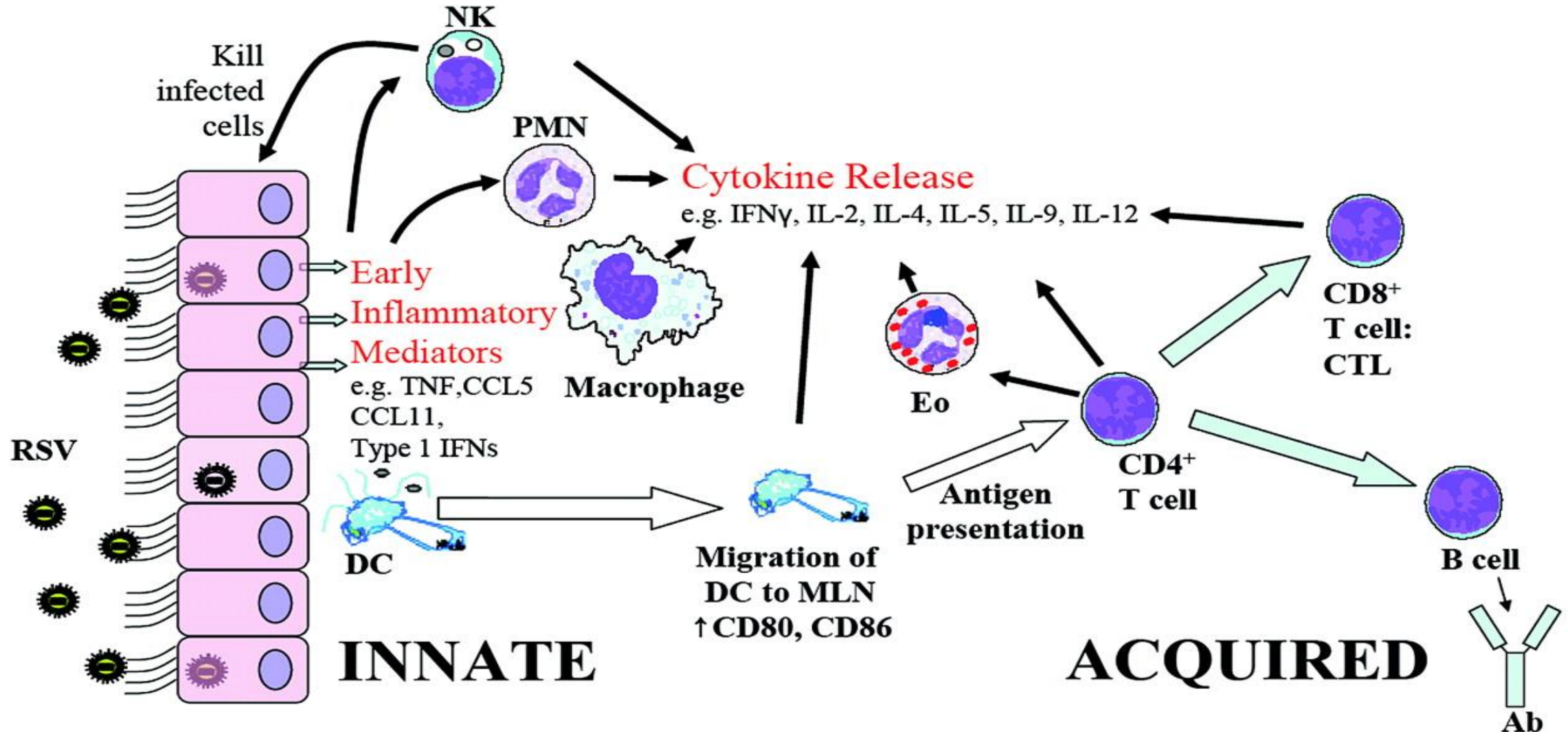


The Killers (T-Cells)



Sore Throat? Inflammation?
What's The Point?

What Are Two Things That Keep T Cells In Tip Top Shape?



Vitamin D is Crucial to Activating T Cells

- When a T cell is exposed to a foreign pathogen, it extends an 'antenna' known as a vitamin D receptor, and searches for vitamin D.
- If the T cells **cannot find enough vitamin D in the blood**, T cells won't even begin to mobilize.

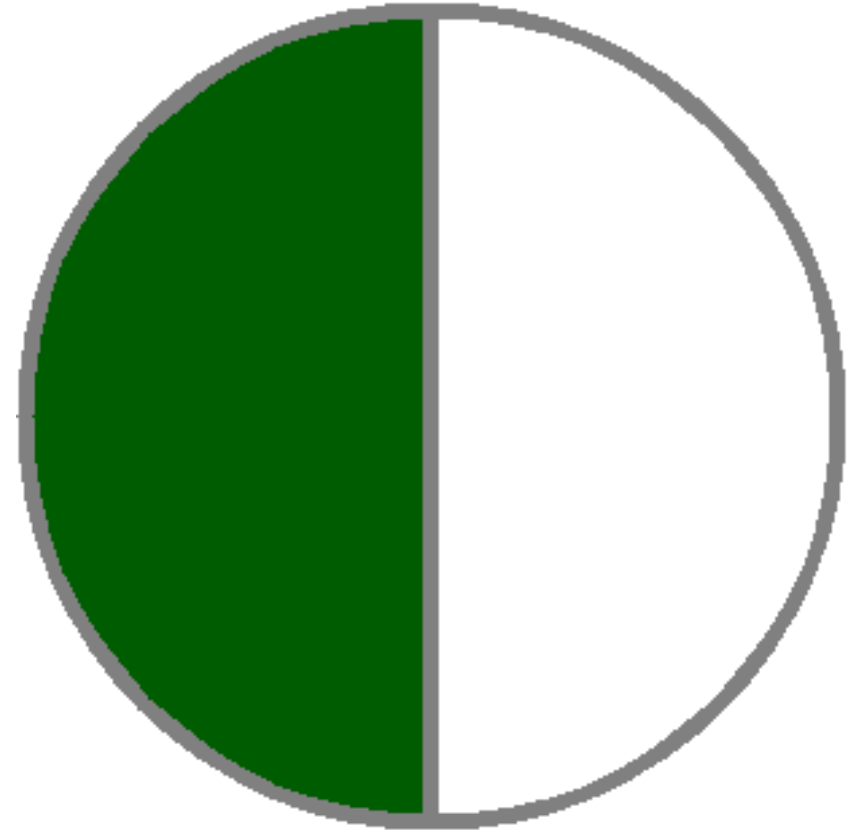


What Percentage of the Population is Deficient in Vitamin D?

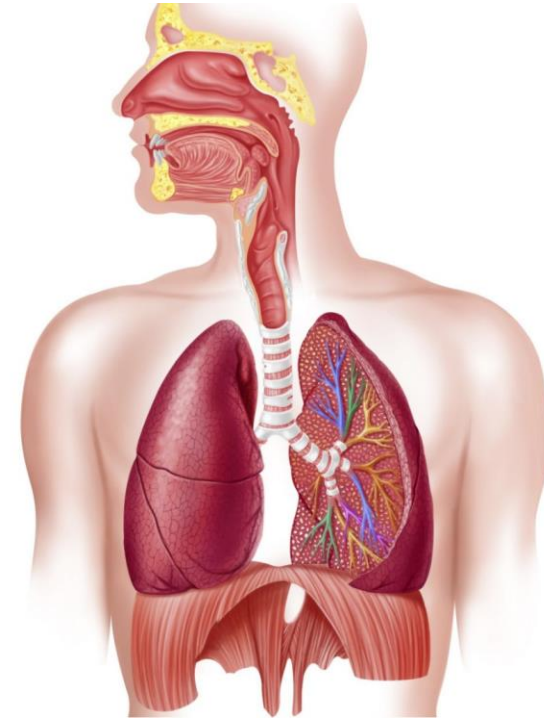


About 1 billion People Worldwide have Vitamin D Deficiency

- 50% of the population has vitamin D insufficiency
- The prevalence of patients with vitamin D deficiency is highest in the elderly, the obese patients, nursing home residents, and hospitalized patients.



Vitamin D Lowered Risk of Respiratory Infections By How Much? (In those with Lowest Vitamin D Levels)



Adrian R Martineau, David A Jolliffe, Richard L Hooper, Lauren Greenberg, John F Aloia, Peter Bergman, Gal Dubnov-Raz, Susanna Esposito, Davaasambuu Ganmaa, Adit A Ginde, Emma C Goodall, Cameron C Grant, Christopher J Griffiths, Wim Janssens, Ilkka Laaksi, Semira Manaseki-Holland, David Mauger, David R Murdoch, Rachel Neale, Judy R Rees, Steve Simpson, Iwona Stelmach, Geeta Trilok Kumar, Mitsuyoshi Urashima, Carlos A Camargo. **Vitamin D supplementation to prevent acute respiratory tract infections: systematic review and meta-analysis of individual participant data.** *BMJ*, 2017; i6583 DOI: [10.1136/bmj.i6583](https://doi.org/10.1136/bmj.i6583)

Sources of Vitamin D: For Immune Health

- About 50 to 90% of Vitamin D is produced as a natural byproduct of the skin's exposure to UVB sunlight.
- Cold and flu season???
- How much sunlight?



How Much Sun and When?

- In the UK, 9 minutes of midday sunlight exposure during summer three times per week is enough to maintain healthy Vitamin D levels among lighter skinned adults.
- Studies suggest darker skin takes 30 minutes of sunlight.
- Forearms and lower legs? Face???



Too Much Sun???

- Too much sun exposure can weaken immune system. Raise risk of eye and skin damage and cancer.
- Expose arms or legs instead of face for short time.
- Balance is everything.



Vitamin D Rich Food

- Fish liver oil
- Eggs
- Fatty fish such as salmon, herring and mackerel
- Vitamin D fortified foods



Vitamin D Supplements:

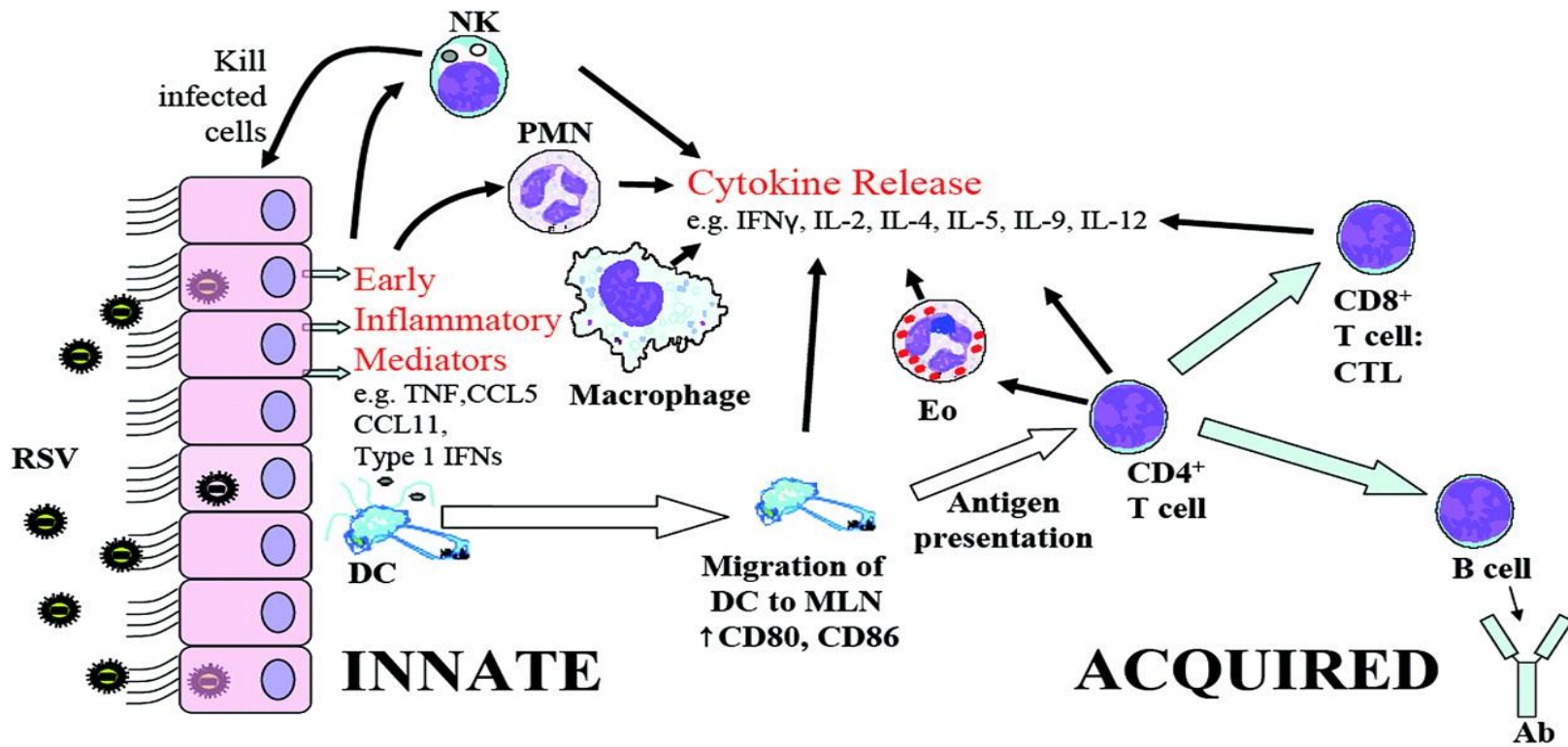


- Based on current research: consuming 1,000–4,000 IU (25–100 mcg) of vitamin D daily should be ideal for most people to reach healthy vitamin D blood levels.
- It not recommended to consume more than 4,000 IU of vitamin D without your doctor's permission. It exceeds the safe upper limits of intake and is not linked to more health benefits and can have risks.

Vitamin D Supplementation Key Points:

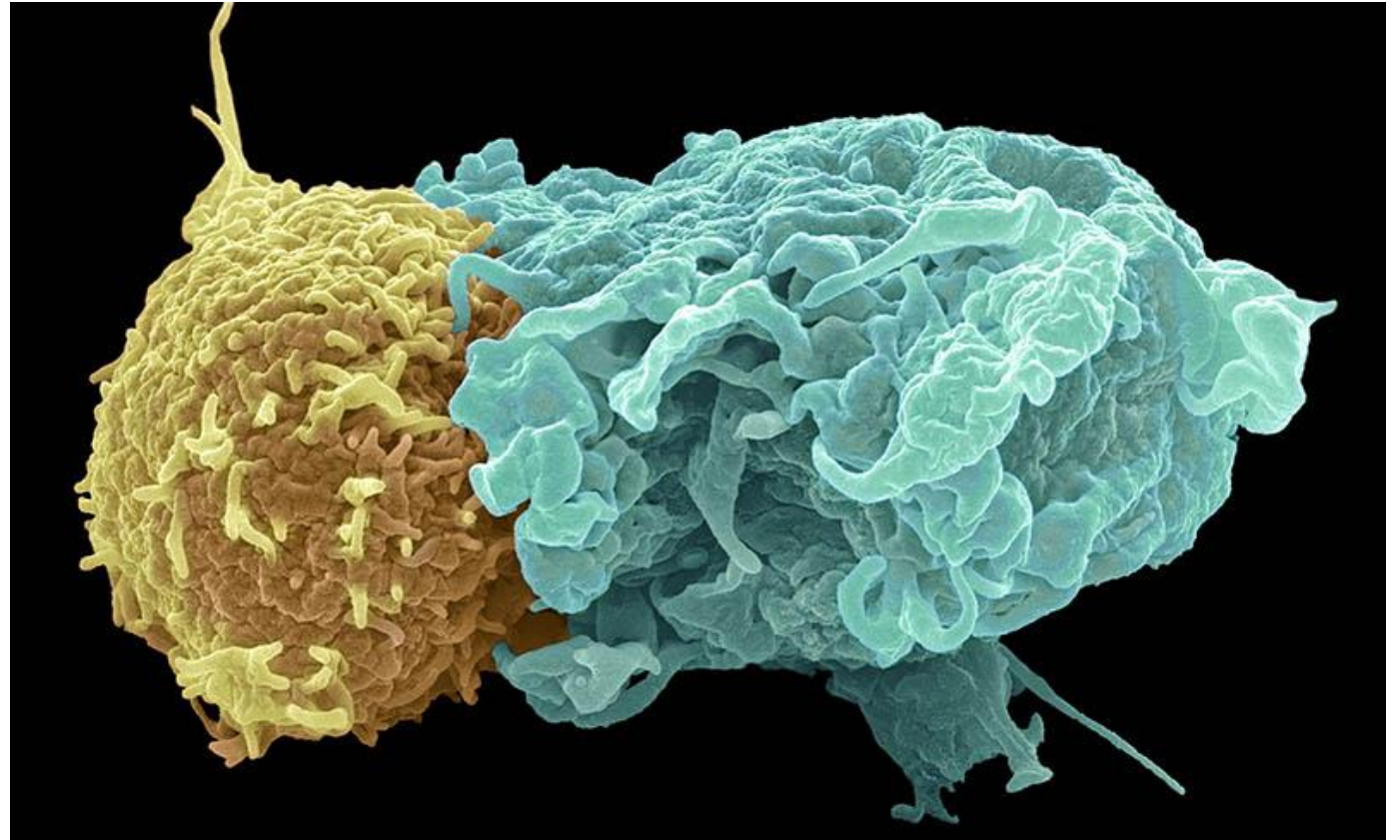
- Talk to personal physician.
- Blood tests in current situation? What to do now?
- In current climate email or telehealth.
- Order online, minimize trips to store right now.
- Side effects of Vitamin D supplementation are rare, but high intakes can cause elevated blood levels of calcium. **Vitamin D Overdose: More is not better.**

T cells become one of two types of Immune Cells: Killers or Helpers



Second Take
Home Tip:
What helps T
Cells Attach
and Kill
Viruses?

The T Cell “Listens” and “Senses”

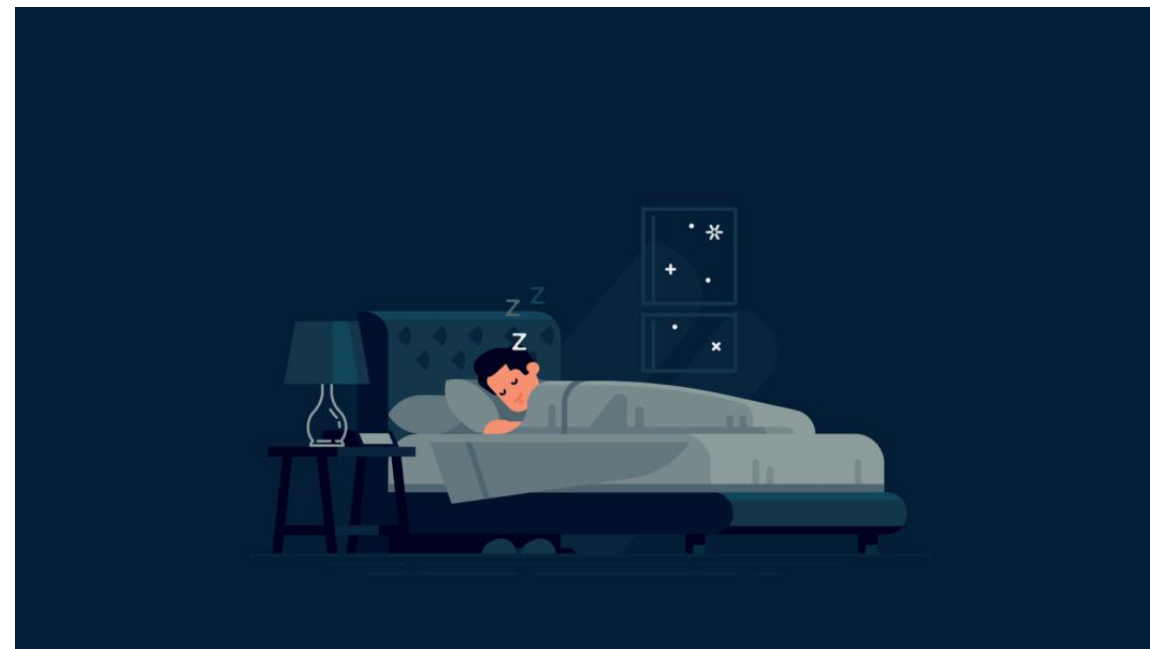




Interesting Study on Common Cold Virus

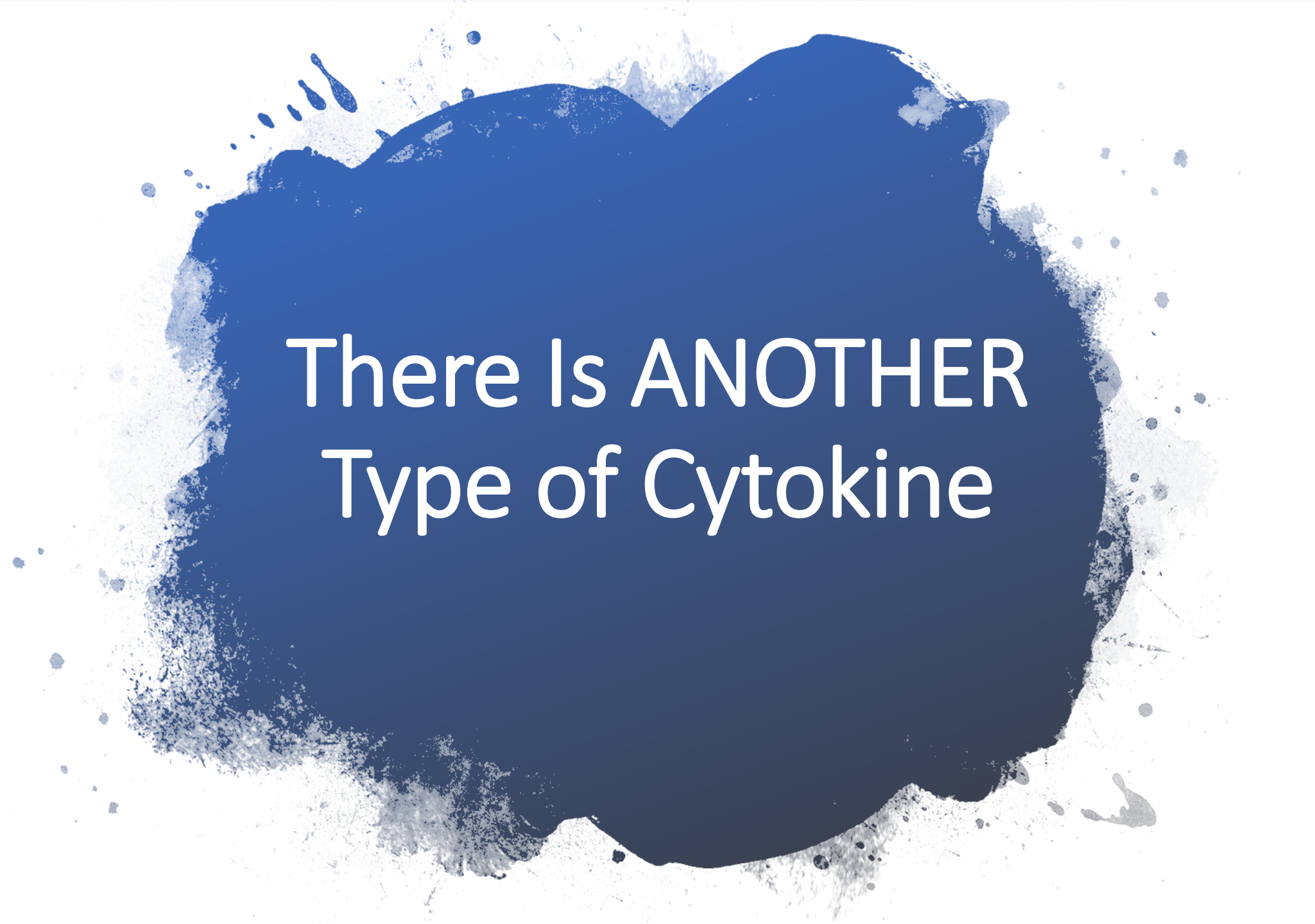
- Those who reported good sleep quality and sleep duration of at least 7 hours?

Sleep and T Cells



Be Careful of
Binge
Watching at
Night! Staying
on a Schedule





There Is ANOTHER
Type of Cytokine

Have You Seen This Happen?



Have You Seen This Happen?



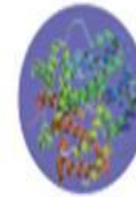
Anti-inflammatory cytokine

Peace Keepers (Anti Inflammatory Cytokines)

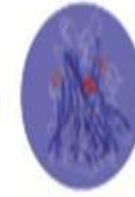


Pro-inflammatory Cytokines : stimulate the immune system

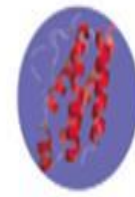
Th1



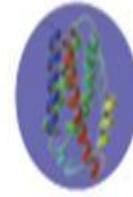
INF- γ



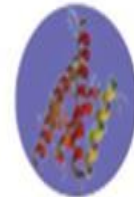
TNF- α



IL-2



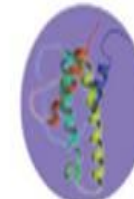
IL-6



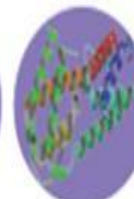
IL-12

Anti-inflammatory Cytokines : suppress the immune system

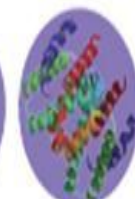
Th2



IL-4



IL-5



IL-10



TGF- β

Crystallography derived from RCSB Protein Data Bank.¹



The Balance Between Fighters And Peace Keepers (How Does Cytokine Storm Fit In?)



How Do Autoimmune Diseases Fit In?

- Hypersensitive T cells mistake fragments of the body's own cells for foreign pathogens, leading to the body launching an attack upon itself.



Effectively Treat Infections,
Chronic Diseases

Obesity, Heart Disease,
Diabetes can cause
immune system
dysfunction.

It's a two way street.

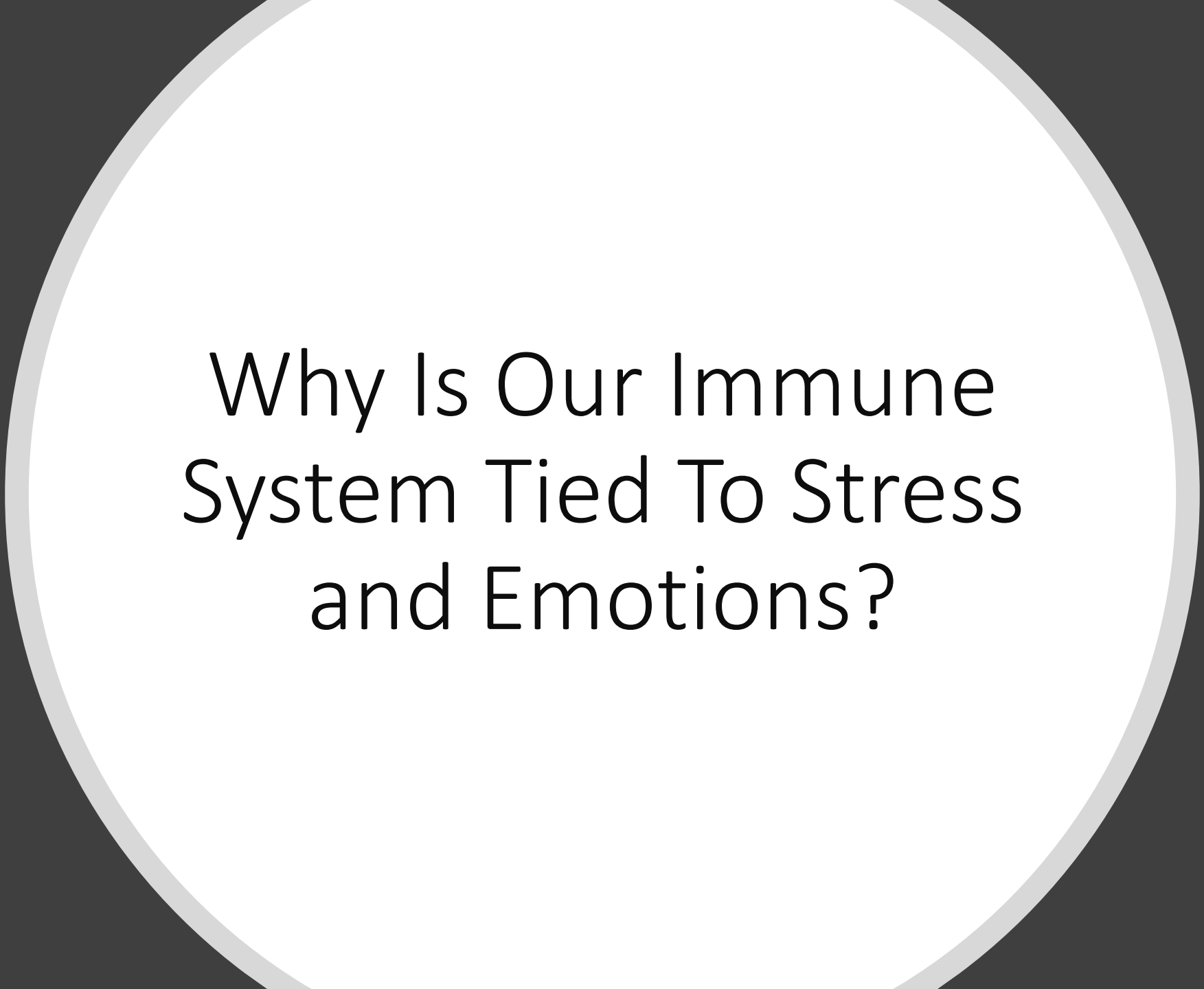


- What Is The Immune System Anticipating?

Anger and The Immune System? Pro or Anti-Inflammatory Cytokines

Negative Emotion Can Cause Pro Inflammatory Cytokines To Activate Killer T Cells





Why Is Our Immune
System Tied To Stress
and Emotions?

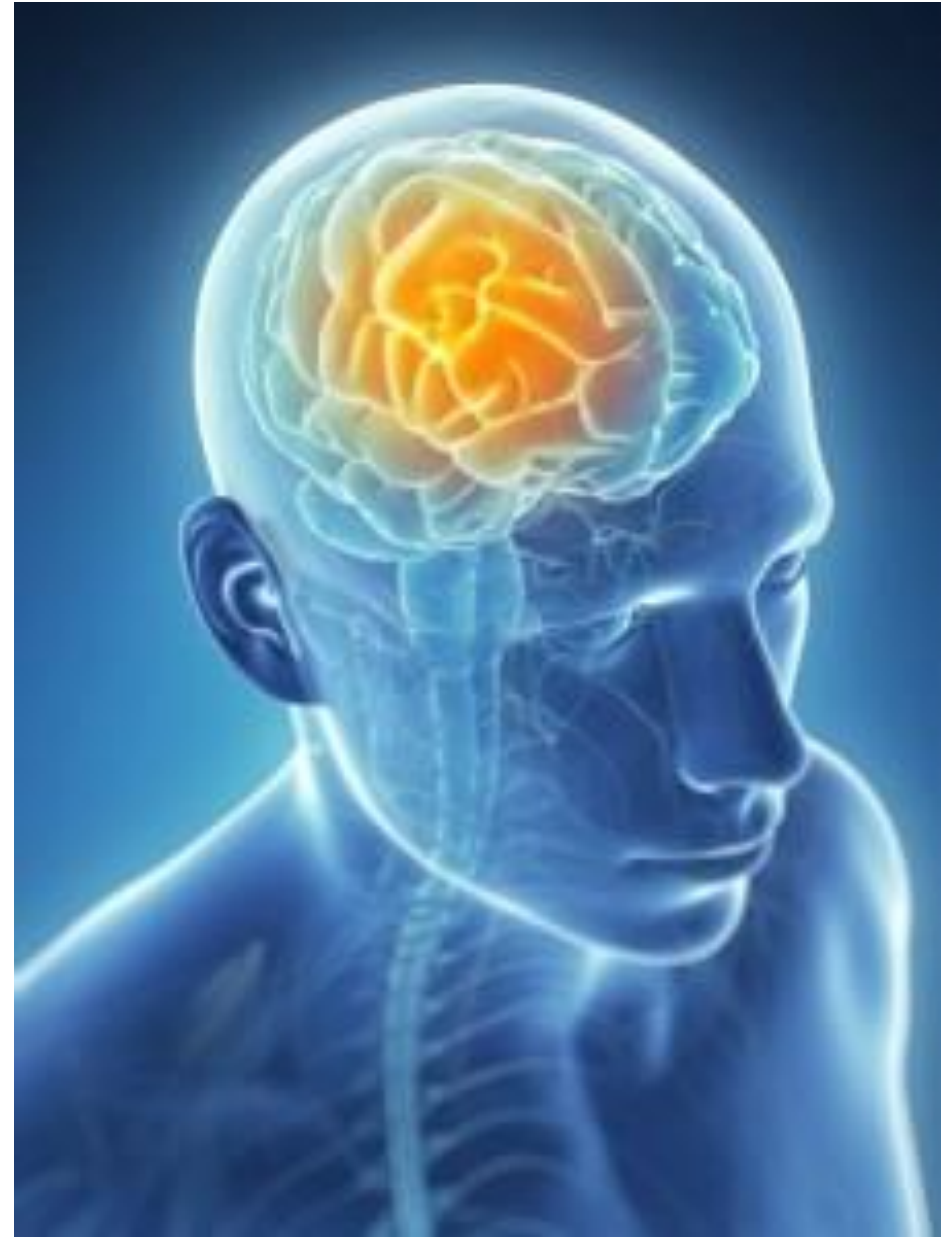


Remembering Anger



Mind Body Connection

Low Levels of
Chronic
Inflammation
Due To
Chronic Stress





Be Careful of Doom Scrolling



What Can We Do?

Just Relax
Already!!!!



It's OK to not feel OK.

It's normal to not feel normal.

Positive Distraction: Mindfulness, Tai Chi, Yoga Lower Pro Inflammatory Cytokines



Irwin M, Pike J, Oxman M. Shingles immunity and health functioning in the elderly: Tai Chi Chih as a behavioral treatment. *Evid Based Complement Alternat Med* 2004; **1**:223–32. 36Irwin MR, Pike JL, Cole JC, Oxman MN. Effects of a behavioral intervention, Tai Chi Chih, on varicella-zoster virus specific immunity and health functioning in older adults. *Psychosom Med* 2003; **65**:824–30. [CrossRef](#),
37Chiang J, Chen YY, Akiko T, Huang YC, Hsu ML, Jang TR, Chen YJ. Tai Chi Chuan increases circulating myeloid dendritic cells. *Immunol Invest* 2010; **39**:863–73. [CrossRef](#),
38Li H, Geib RW. Exploring the use of five color flow cytometry to examine the effect of acute tai chi practice on pro inflammatory monocyte subtypes – biomed 2013. *Biomed Sci Instrum* 2013; **49**:209–15 Ivana Buric, Miguel Farias, Jonathan Jong, Christopher Mee, Inti A. Brazil. **What Is the Molecular Signature of Mind–Body Interventions? A Systematic Review of Gene Expression Changes Induced by Meditation and Related Practices.** *Frontiers in Immunology*, 2017; 8 DOI: [10.3389/fimmu.2017.00670](https://doi.org/10.3389/fimmu.2017.00670)



Mindful Hobbies, Connecting and permission for SELF CARE

New Study: “social fuel tank” measurement for each participant.



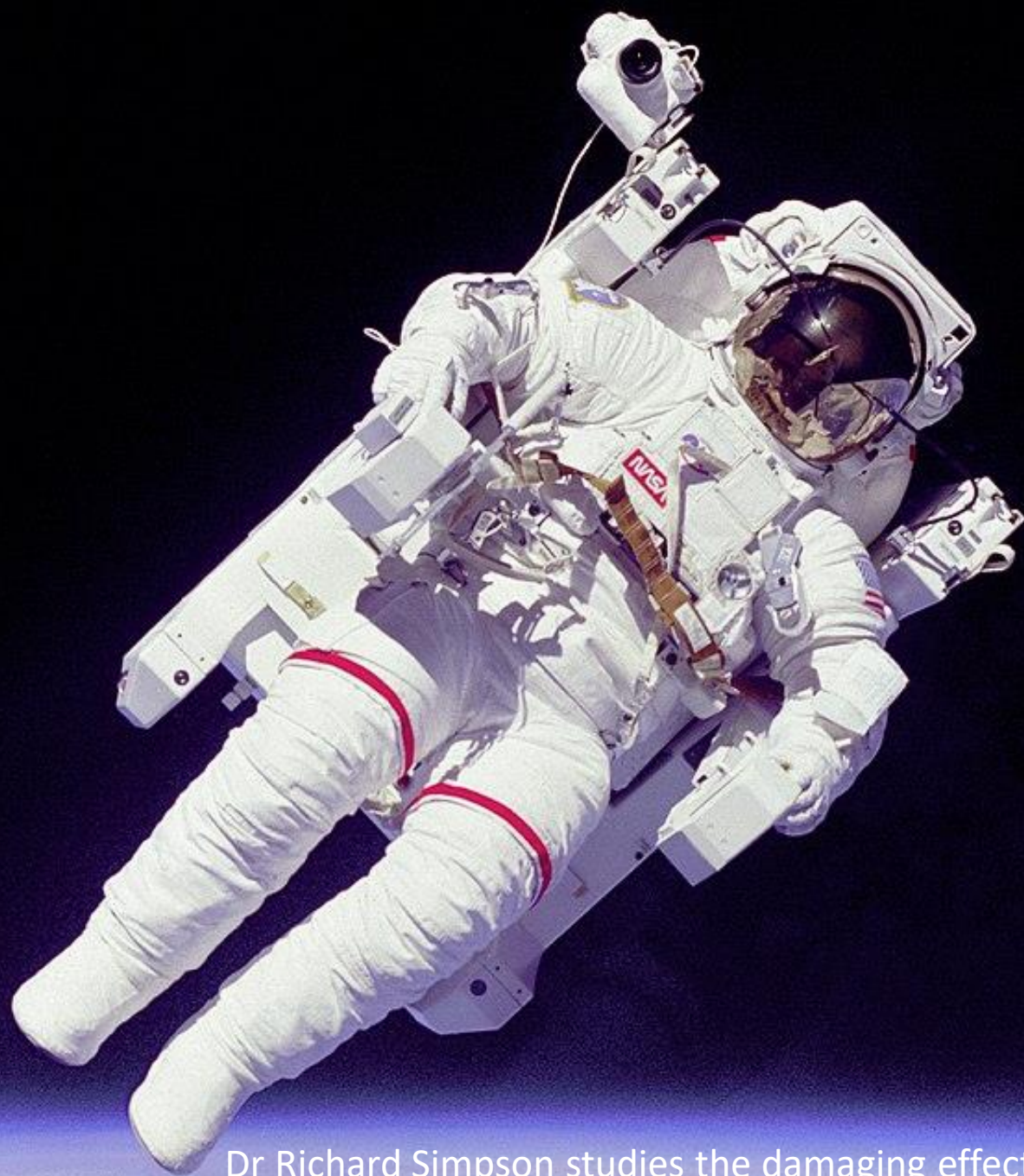
A New Study With ER Doctors and Nurses

Pets and Stress: Interesting New Study



Jeffrey A. Kline, Kimberly VanRyzin, Jacob C. Davis, Jonathan A. Parra, Maxwell L. Todd, Liza L. Shaw, Benjamin R. Haggard, Michelle A. Fisher, Katherine L. Pettit, Alan M. Beck. **Randomized Trial of Therapy Dogs Versus Deliberative Coloring (Art Therapy) to Reduce Stress in Emergency Medicine Providers.** *Academic Emergency Medicine*, 2020; DOI: [10.1111/acem.13939](https://doi.org/10.1111/acem.13939)

Isolation?



Dr Richard Simpson studies the damaging effects of isolation on the human immune system.



Stress, Isolation and Loneliness Can Throw Off The Immune System

Three Things That Rebalance The Immune System (Astronaut Studies and Other Studies)



Steven W. Cole, John P. Capitanio, Katie Chun, Jesusa M. G. Arevalo, Jeffrey Ma, John T. Cacioppo. **Myeloid differentiation architecture of leukocyte transcriptome dynamics in perceived social isolation.** *Proceedings of the National Academy of Sciences*, 2015; 201514249 DOI: [10.1073/pnas.1514249112](https://doi.org/10.1073/pnas.1514249112)

Food and Your Immune System: Anti Inflammatory Foods and Foods For Immune Health



One Ingredient and Inflammation

1. Nicholas Jones, Julianna Blagih, Fabio Zani, April Rees, David G. Hill, Benjamin J. Jenkins, Caroline J. Bull, Diana Moreira, Azari I. M. Bantan, James G. Cronin, Daniele Avancini, Gareth W. Jones, David K. Finlay, Karen H. Vousden, Emma E. Vincent, Catherine A. Thornton. **Fructose reprogrammes glutamine-dependent oxidative metabolism to support LPS-induced inflammation.** *Nature Communications*, 2021; 12 (1) DOI: [10.1038/s41467-021-21461-4](https://doi.org/10.1038/s41467-021-21461-4)

Are These Ingredients Food or a Chemistry Experiment?

INGREDIENTS: SUGAR, WATER, BLEACHED ENRICHED FLOUR (WHEAT FLOUR, MALTED BARLEY FLOUR, NIACIN, FERROUS SULFATE OR REDUCED IRON, THIAMINE MONONITRATE, RIBOFLAVIN, FOLIC ACID), HIGH FRUCTOSE CORN SYRUP, SHORTENING (PALM OIL, MONO AND DIGLYCERIDES, POLYSORBATE 60), SHORTENING (TALLOW, HYDROGENATED TALLOW, COTTONSEED OIL, MONO AND DIGLYCERIDES, POLYSORBATE 60, SOY LECITHIN), CORN SYRUP, INCLUSIONS (SUGAR, PALM OIL, PALM KERNEL OIL, ENRICHED FLOUR [WHEAT FLOUR, NIACIN, REDUCED IRON OR FERROUS SULFATE, THIAMINE MONONITRATE, RIBOFLAVIN, FOLIC ACID], CORNSTARCH, RED 3, SOY LECITHIN, BLUE 2 LAKE), CONTAINS 2% OR LESS: SHORTENING (TALLOW, HYDROGENATED TALLOW), MODIFIED CORNSTARCH, CORNSTARCH, EGG, SOYBEAN OIL, WHEY, EGG WHITES, NONFAT DRY MILK, SALT, INULIN, CALCIUM CARBONATE, SODIUM ACID PYROPHOSPHATE, CALCIUM SULFATE, BAKING SODA, MONO AND DIGLYCERIDES, DEFATTED SOY FLOUR, WHEAT STARCH, DEXTROSE, ARTIFICIAL FLAVOR, SORBIC ACID AND POTASSIUM SORBATE (TO RETAIN FRESHNESS), CELLULOSE GUM, GUAR GUM, SODIUM STEAROYL LACTYLATE, GLYCERIN, AGAR, TITANIUM DIOXIDE (COLOR), XANTHAN GUM, CALCIUM CASEINATE, SODIUM CASEINATE, SOY PROTEIN ISOLATE, PALM OIL, MONOCALCIUM PHOSPHATE, LOCUST BEAN GUM, ENZYMES, BLUE 1 LAKE, YELLOW 5 LAKE, SOY LECITHIN, SODIUM PHOSPHATE, SUNFLOWER OIL, CARMINE, RED 40 LAKE, RED 3. 524831
CONTAINS WHEAT, SOY, MILK AND EGG

Per Serving
ZERO_g trans FAT

No Trans Fatty Acids

Nutrition Facts		Amount/Serving	% DV*	Amount/Serving	% DV*
Serv. Size 1 Tbsp. (14g)		Total Fat 8g	12%	Cholest. 0mg	0%
Servings 16		Sat. Fat 1g	5%	Sodium 110mg	5%
Calories 70		Polyunsat. Fat 2g		Total Carb. 0g	0%
Fat Cal. 70		Monounsatur. Fat 4g		Protein 0g	
* Percent Daily Values (DV) are based on a 2,000 calorie diet.		Vitamin A 10%		Vitamin E 20%	
		Not a significant source of dietary fiber, sugars, vitamin C, calcium and iron.			

Ingredients: Liquid Canola Oil, Water, Plant Stanol Ester, Partially Hydrogenated Soybean Oil, Salt, Emulsifiers (Vegetable Mono- and Diglycerides, Soy Lecithin, Polyglycerol Esters of Fatty Acids), Hydrogenated Soybean Oil, Potassium Sorbate, Citric Acid and Calcium Disodium EDTA to Preserve Freshness, Artificial Flavor, dl- α -Tocopheryl Acetate, Vitamin A Palmitate, Colored with Beta Carotene.

An inflammatory diet is characterized by the consumption of refined carbohydrates, red and processed meat, and saturated or trans fats.

Low Inflammation Foods

(Think the outer edge of grocery store)



*At least three servings
of whole grains a day*



*A salad and one other
vegetable a day*



Beans every other day




*Poultry and berries at
least twice a week*



A serving of nuts a day



*Fish at least once
a week*



One other anti-
inflammatory food to be
aware of?

Dark Chocolate

- Consuming dark chocolate that has a high concentration of cacao (minimally 70% cacao, 30% organic cane sugar) has positive effects on stress levels, inflammation, mood, memory and immunity.



Two Other Emerging Insights
(Both Studies Published In Last Few Weeks)

Eating at Regular Meal Times? (New Study: Still Emerging)

- Researchers found in **laboratory models**, that eating causes a hormone called VIP to kickstart the activity of immune cells in response to potentially incoming pathogens or 'bad' bacteria.
- Immunity increased at anticipated mealtimes indicating that maintaining regular eating patterns could be more important than previously thought.



Too much salt weakens the immune system

A diet rich in salt weakens the antibacterial immune defense

- Human volunteers who consumed an additional 6 grams of salt per day also showed pronounced immune deficiencies.
- This amount corresponds to the salt content of two fast food meals.



The Dietary Guidelines for Americans recommends limiting sodium to less than 2,300 mg a day.

Quick Tips on Salt: Salt by any other Name and a Labelling Trick:

- Monosodium glutamate (MSG)
- Baking soda (also called sodium bicarbonate)
- Baking powder
- Disodium phosphate
- Sodium alginate
- Sodium citrate
- Sodium nitrite
- Try to avoid products with more than 200 mg of sodium per serving. And be sure you know how many servings are in a package.
- **The reduced sodium trick:**



Vitamin C Rich Foods: Orange Juice?



Which of these foods has MORE Vitamin C Than an Orange?



[Br J Nutr.](#) 2012 Oct;108(7):1235-45. Epub 2011 Dec 15.
Consumption of gold kiwifruit reduces severity and duration of selected upper respiratory tract infection symptoms and increases plasma vitamin C concentration in healthy older adults.
[Hunter DC](#)¹, [Skinner MA](#), [Wolber FM](#), [Booth CL](#), [Loh JM](#), [Wohlers M](#), [Stevenson LM](#), [Kruger MC](#).

Does Alcohol Boost or Suppress The Immune System? (Moderate, Heavy, Binge?)



Sarkar D, Jung MK, Wang HJ. Alcohol and the Immune System. *Alcohol Res.* 2015;37(2):153–155.

A. Eken, V. Ortiz, J. R. Wands. **Ethanol Inhibits Antigen Presentation by Dendritic Cells.** *Clinical and Vaccine Immunology*, 2011; 18 (7): 1157 DOI: [10.1128/CVI.05029-11](https://doi.org/10.1128/CVI.05029-11)

Romeo J, Wärnberg J, Nova E, Díaz LE, Gómez-Martínez S, Marcos A. Moderate alcohol consumption and the immune system: a review. *Br J Nutr.* 2007;98 Suppl 1:S111–S115. doi:10.1017/S0007114507838049

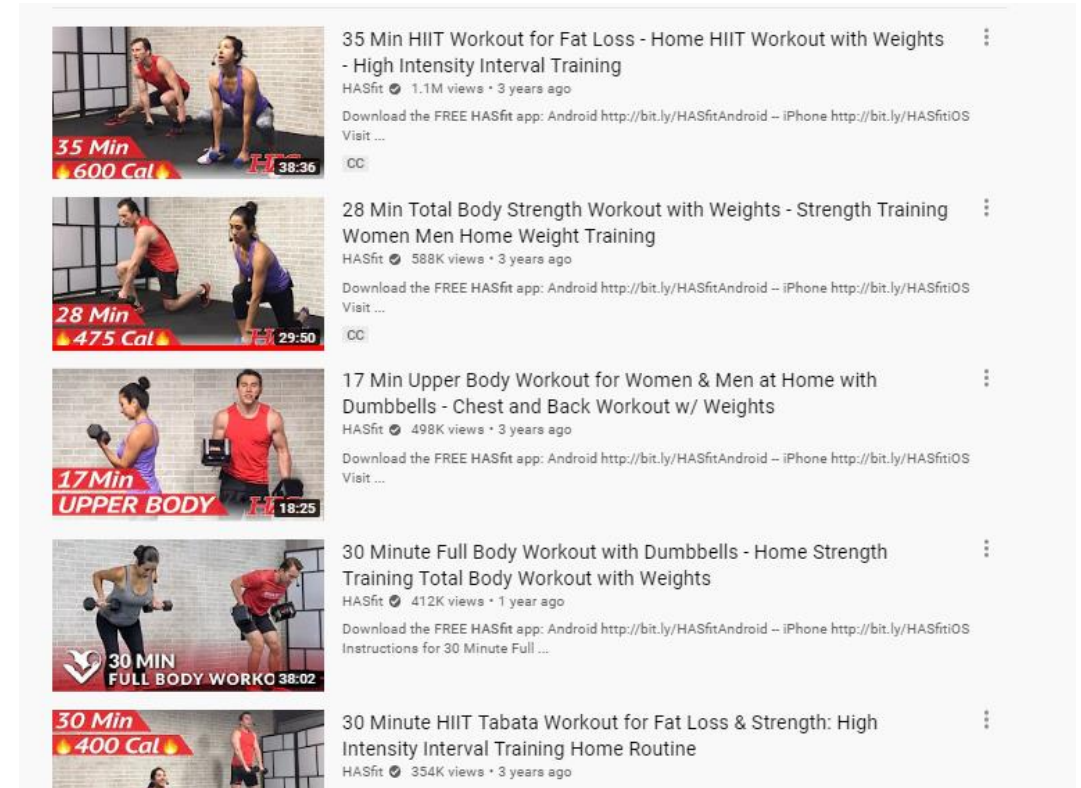
I. Messaoudi, M. Asquith, F. Engelmann, B. Park, M. Brown, A. Rau, J. Shaw, K.A. Grant. **Moderate alcohol consumption enhances vaccine-induced responses in rhesus macaques.** *Vaccine*, 2013; 32 (1): 54 DOI: [10.1016/j.vaccine.2013.10.076](https://doi.org/10.1016/j.vaccine.2013.10.076)



What Made The Biggest
Difference In
Astronaut/Isolation Studies?

Regular exercise benefits immunity -- even in Review of Studies and Astronaut Studies.....

- Regular moderate intensity aerobic exercise, such as walking, running or cycling is recommended, with the aim of achieving **20 minutes most days**.
- Intensity of exercise? What does it do?
- Online workouts for any level.....



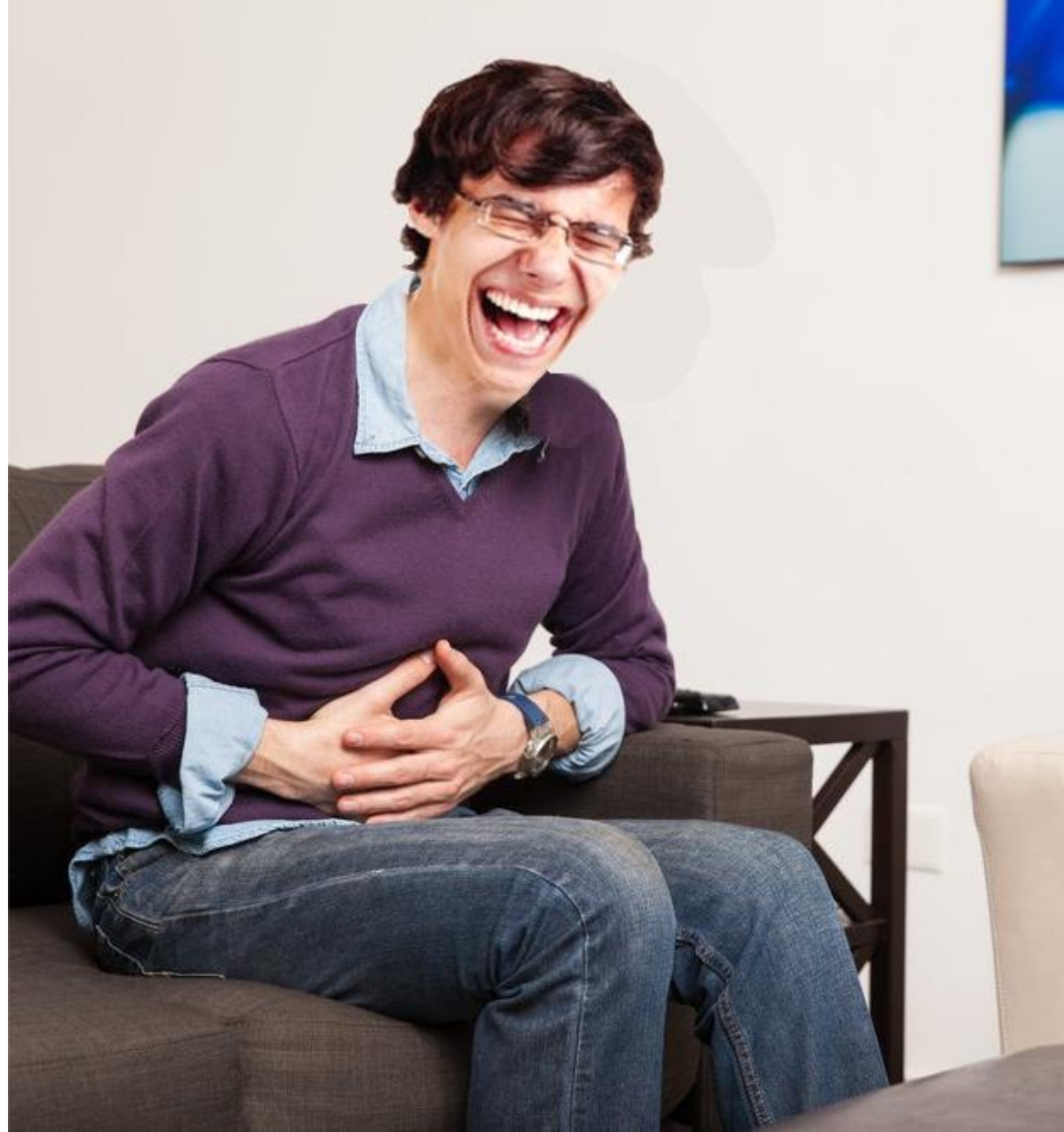
Last Study: (Small Study but Interesting)

- A group of 20 high-risk diabetic patients with hypertension and hyperlipidemia were divided into two groups.
- Both groups on standard medications for diabetes, hypertension and hyperlipidemia.
- Researchers followed both groups for 12 months, testing their blood for:
 - stress hormones epinephrine and norepinephrine
 - HDL cholesterol
 - inflammatory cytokines TNF- α IFN- γ and IL-6, C-reactive

A Dose of Funny 30 Minutes of Comedy a Day

Patients in the laughter group had:

- lower stress hormones
- increased HDL (good) cholesterol. HDL cholesterol had risen by 26 percent in (laughter) and only 3 percent in the control).
- Lower levels of pro inflammatory cytokines decreased 66 % in the laughter group vs. 26 % for the control group.



Thanks!