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Professional Education Series

Support. Inform. Educate. Empower.

The Role of Nutrition in Immunity & Recovery, with Emerging Concepts in “Long-COVID”



WEBINAR HOST:

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VP of Healthcare, Sports & Professional Education
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Assistant Professor - Research
Pennington Biomedical Research Center

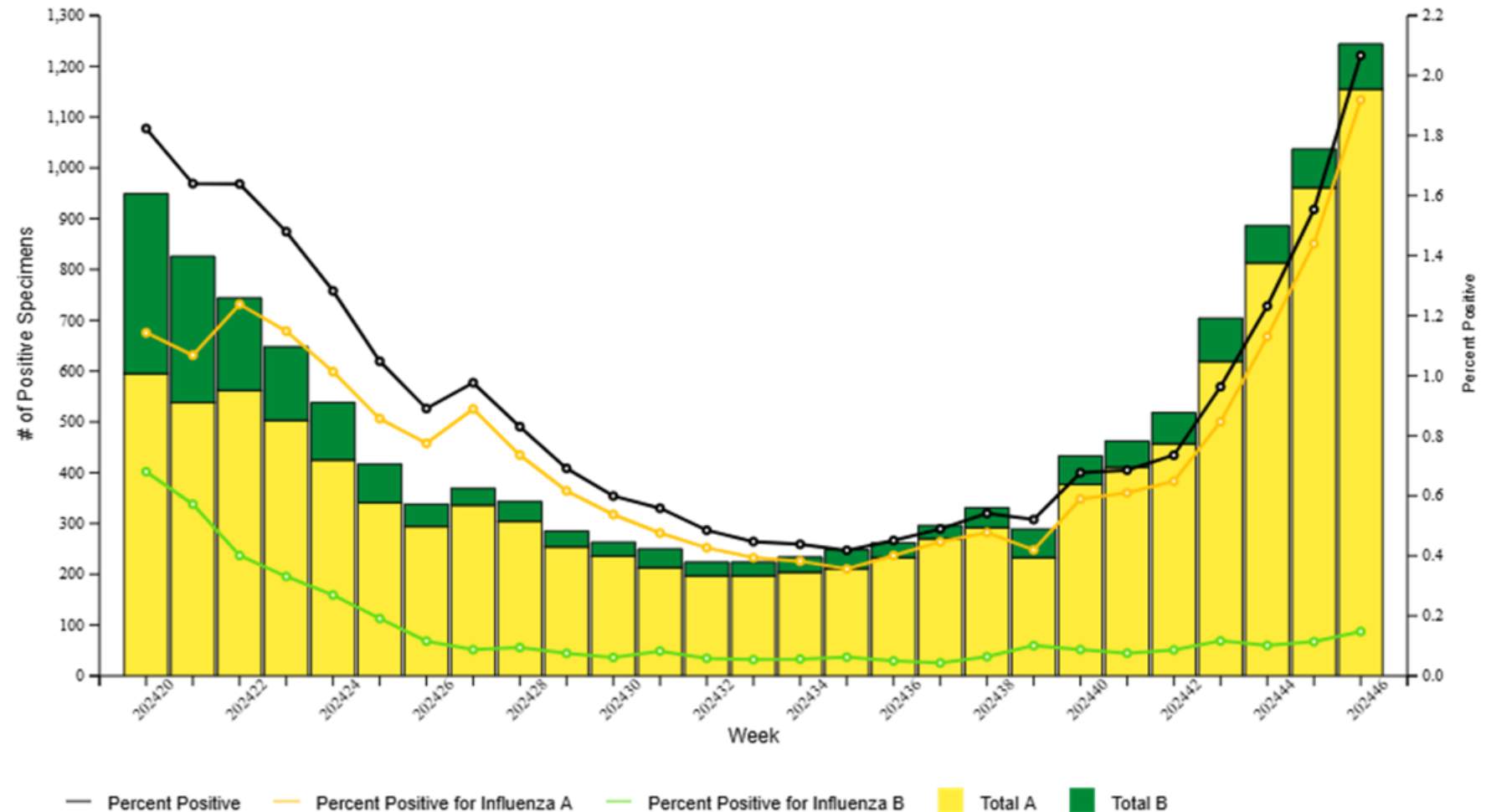
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Influenza Positive Tests Reported to CDC by Clinical Laboratories,
National Summary, 2024-25 Season, week ending Nov 16, 2024

Why
Immunity &
Why Now?



Questions we'll address today:



Which diet factors can impact immunity?



Which dietary supplements are beneficial?



What is the immune response to a vegan or ketogenic diet?

Content of the Presentation

Interplay between nutrition & immunity	Vitamins C, D, zinc, iron, probiotics, botanicals
Nutrition to combat respiratory infections (e.g., flu)	Lean on systematic reviews and trials in endurance athletes and COVID
Food vs Supplements	Key resources for new & emerging data on supplements Vegan vs Keto effects on immune system
Application towards clinical practice	Patient populations and my personal care algorithms

Pennington Biomedical Research Center

The New England Journal of Medicine

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VOLUME 336

APRIL 17, 1997

NUMBER 16



A CLINICAL TRIAL OF THE EFFECTS OF DIETARY PATTERNS ON BLOOD PRESSURE

LAWRENCE J. APPEL, M.D., M.P.H., THOMAS J. MOORE, M.D., EVA OBARZANEK, PH.D., WILLIAM M. VOLLMER, PH.D.,
LAURA P. SVETKEY, M.D., M.H.S., FRANK M. SACKS, M.D., GEORGE A. BRAY, M.D., THOMAS M. VOGT, M.D., M.P.H.,
JEFFREY A. CUTLER, M.D., MARLENE M. WINDHAUSER, PH.D., R.D., PAO-HWA LIN, PH.D., AND NJERI KARANJA, PH.D.,
FOR THE DASH COLLABORATIVE RESEARCH GROUP*

The New England Journal of Medicine

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VOLUME 346

FEBRUARY 7, 2002

NUMBER 6



REDUCTION IN THE INCIDENCE OF TYPE 2 DIABETES WITH LIFESTYLE INTERVENTION OR METFORMIN

DIABETES PREVENTION PROGRAM RESEARCH GROUP*

Pennington Biomedical Research Center

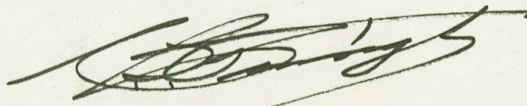


C.B. "Doc" Pennington and his wife
Irene Wells Pennington

MEMO

From the desk of ...
C.B. PENNINGTON

IN FORMULATING THE
ORIGINAL FOUNDATION,
MY ONLY INSTRUCTIONS
WERE THAT THIS SHOULD BE
THE BIGGEST AND BEST
NUTRITION RESEARCH CENTER
IN THE COUNTRY.


4/21/83

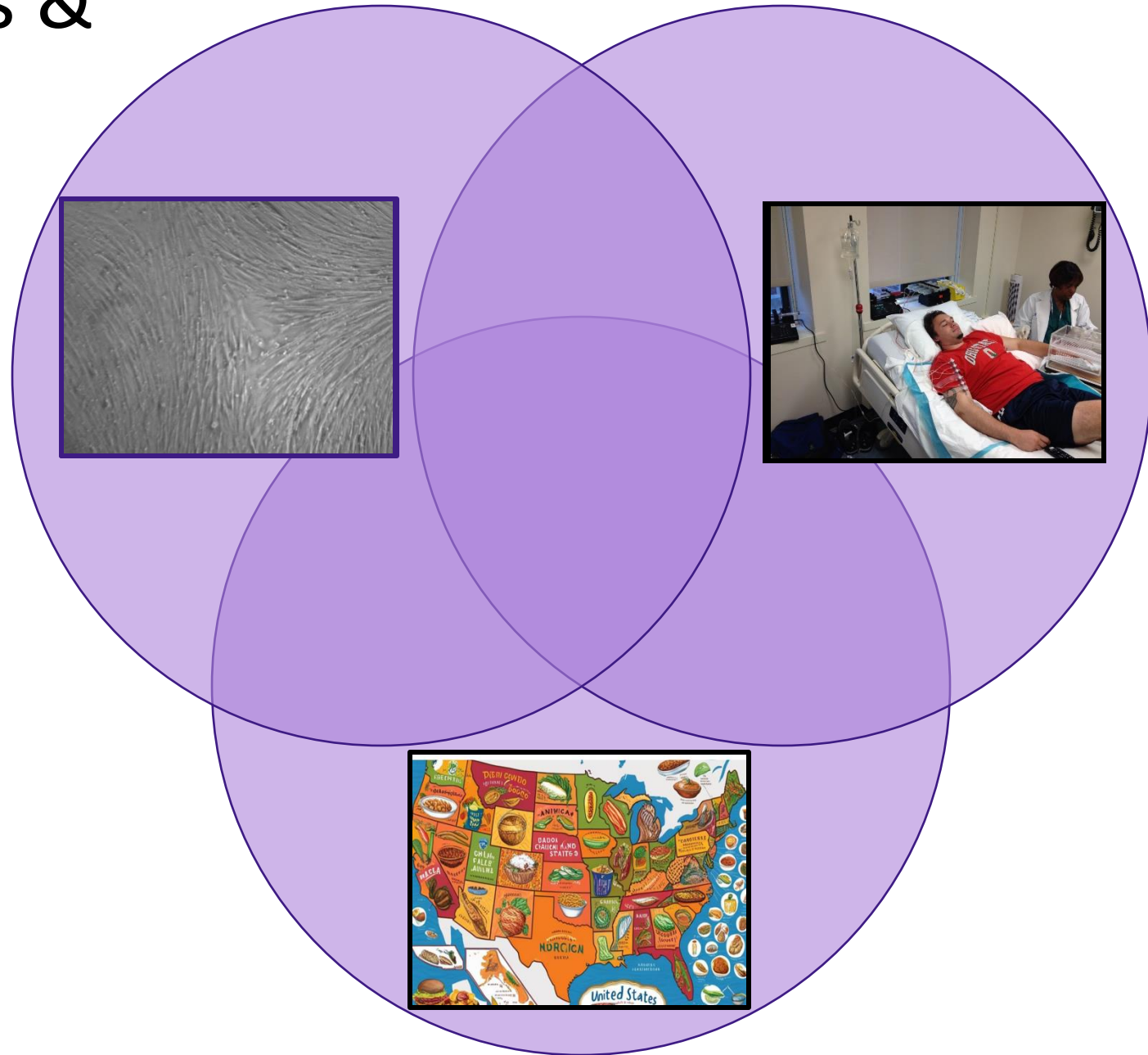
Mitochondrial Energetics & Nutrient Utilization (MENU) Lab

Clinical-Translational Nutrition Research

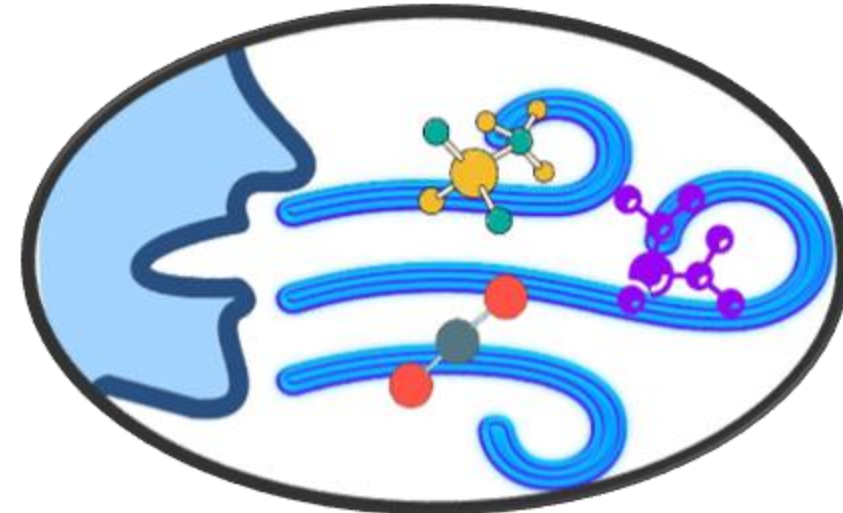
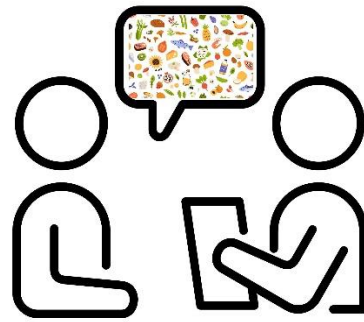
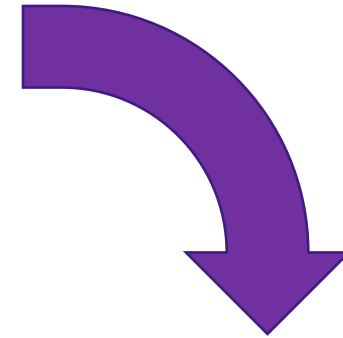
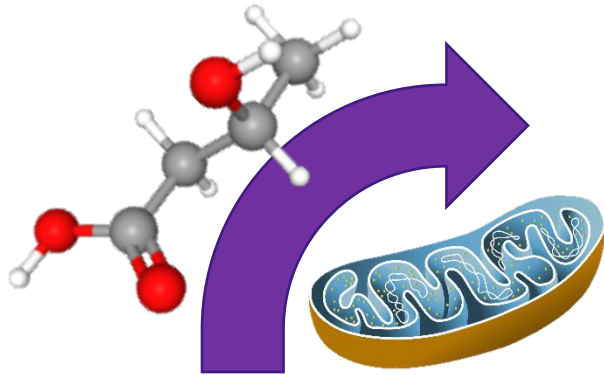


Intersection of multiple research approaches:

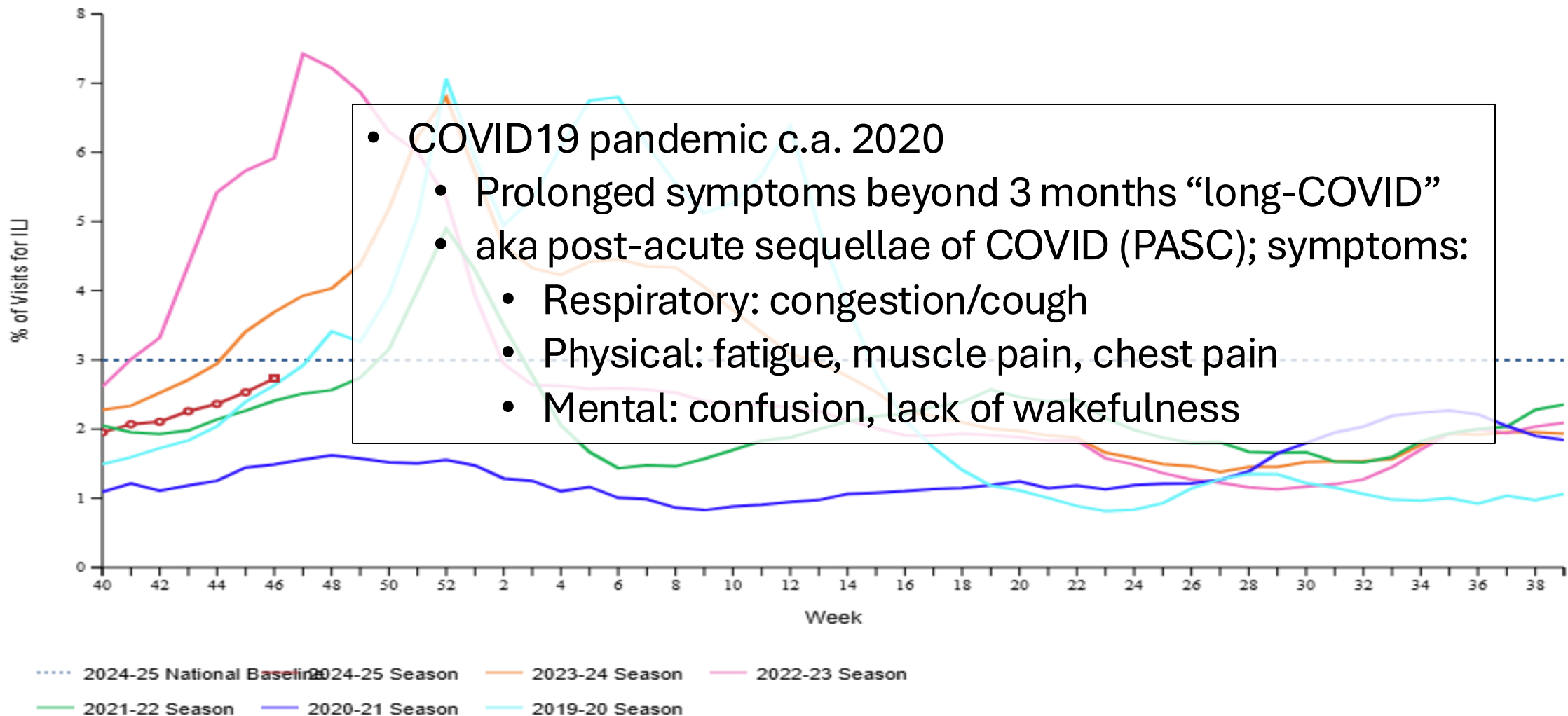
- Cell Culture
- Clinical Trials
- Epidemiology/Big Data



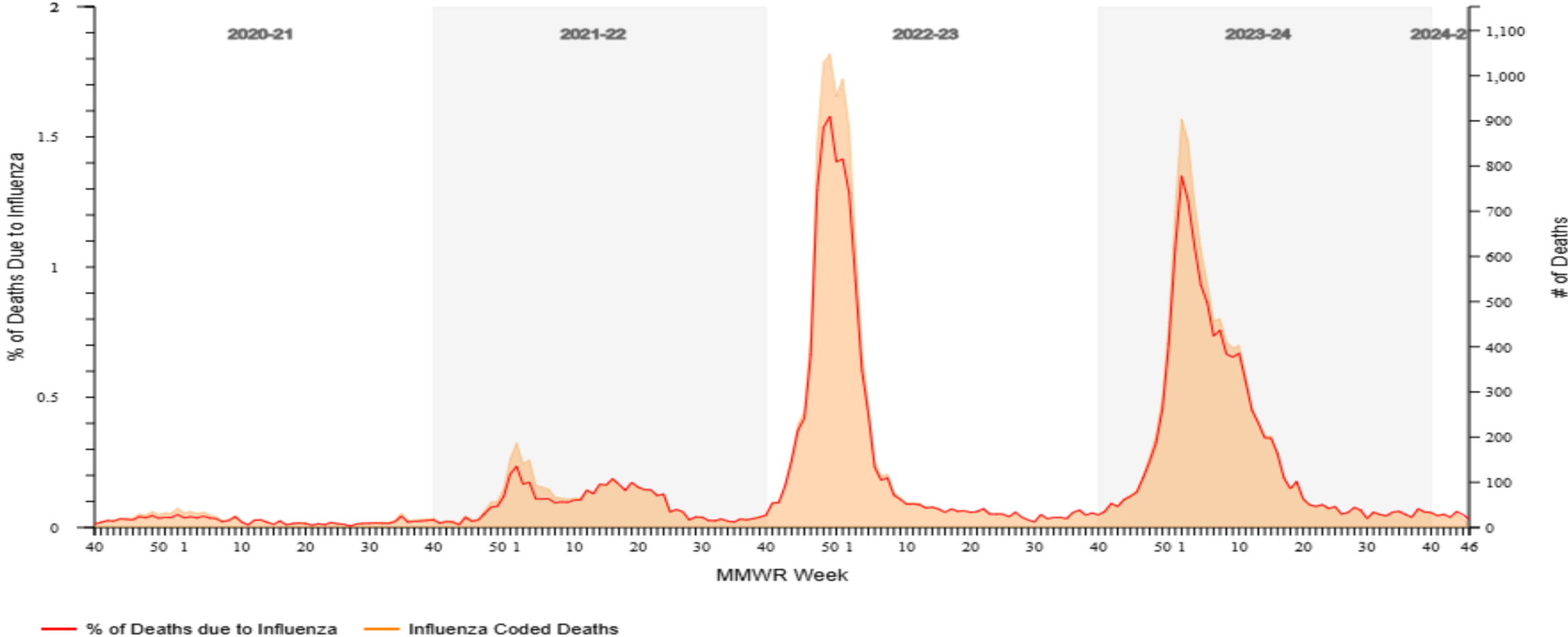
MENU Lab Focus: Pulmonary System



Percentage of Outpatient Visits for Respiratory Illness Reported by
The U.S. Outpatient Influenza-like Illness Surveillance Network (ILINet),
Weekly National Summary, 2024-25 Season and Selected Previous Seasons



Pneumonia and Influenza Mortality from
the National Center for Health Statistics Mortality Surveillance System
National Summary data through the week ending November 16, 2024



Key Resource!



cdc.gov/fluview



OCTOBER 13, 2023

U.S. Influenza Surveillance: Purpose and Methods

WHAT TO KNOW

The Influenza Division at CDC collects, compiles, and analyzes information on influenza activity year-round in the United States. Included below is a summary of the components of the U.S. Influenza Surveillance System to which data are reported weekly and presented in FluView, CDC's influenza surveillance report.

Overview

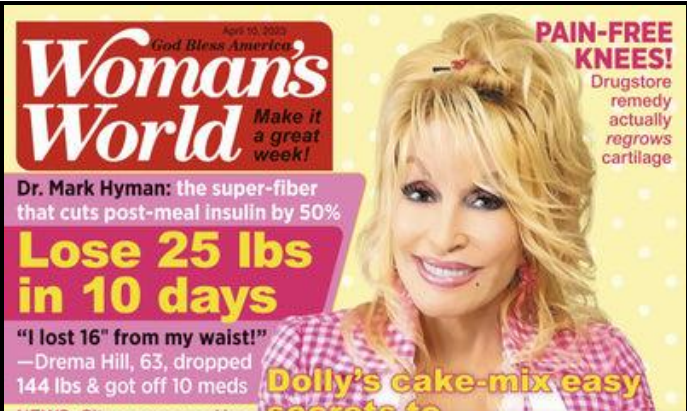
[FluView](#), a weekly influenza surveillance report, and [FluView Interactive](#), an online application that allows for more in-depth exploration of influenza surveillance data, are updated each week. **The data presented each week are preliminary and may change as more data are received.**

Issues with Ads on Nutrition and Immunity

- Misinformation is rampant in the nutrition field
- Nutrition & Immunity are YOUNG fields
 - Only ~100 yrs ago dietitians were established & it was discovered that nutrition prevents disease
 - i.e., “immunity” - Vit C & Scurvy, Vit D & Rickets
 - Only ~75 yrs ago we discovered what caused flu and the common cold:
 - Both respiratory illnesses, but caused by different viruses



Telling the difference between nutrition tabloids and research studies used to be black & white...





Communication

Oreo Cookie Treatment Lowers LDL Cholesterol More Than High-Intensity Statin therapy in a Lean Mass Hyper-Responder on a Ketogenic Diet: A Curious Crossover Experiment

Nicholas G. Norwitz ^{1,*} and William C. Cromwell ²

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² Lipoprotein and Metabolic Disorders Institute, Raleigh, NC 27615, USA; wccromwell@velocityclinical.com
* Correspondence: nicholas_norwitz@hms.harvard.edu

Abstract: Recent research has identified a unique population of ‘Lean Mass Hyper-Responders’ (LMHR) who exhibit increases in LDL cholesterol (LDL-C) in response to carbohydrate-restricted diets to levels ≥ 200 mg/dL, in association with HDL cholesterol ≥ 80 mg/dL and triglycerides ≤ 70 mg/dL. This triad of markers occurs primarily in lean metabolically healthy subjects, with the magnitude of increase in LDL-C inversely associated with body mass index. The lipid energy model has been

THE NEW ENGLAND JOURNAL OF MEDICINE

ORIGINAL ARTICLE

Cardiovascular Effects of Intensive Lifestyle Intervention in Type 2 Diabetes

The Look AHEAD Research Group^a

ABSTRACT

BACKGROUND
Weight loss is recommended for overweight or obese patients with type 2 diabetes on the basis of short-term studies, but long-term effects on cardiovascular disease remain unknown. We examined whether an intensive lifestyle intervention for weight loss would decrease cardiovascular morbidity and mortality among such patients.

METHODS
In 16 study centers in the United States, we randomly assigned 5145 overweight or obese patients with type 2 diabetes to participate in an intensive lifestyle interven-

The authors and their affiliations are listed in the Appendix. Address reprint requests to Dr. Rena Wing at the Weight Control and Diabetes Research Center, Warren Alpert Medical School of Brown University and Miriam Hospital, 106 Richmond St., Providence, RI 02903, or at rwing@lifespan.org.

^aA complete list of participants in the Look AHEAD (Action for Health in Diabetes) Research Group is provided in the Supplementary Appendix, available

Oreo Cookie Treatment Lowers LDL Cholesterol More Than High-Intensity Statin therapy in a Lean Mass Hyper-Responder on a Ketogenic Diet: A Curious Crossover Experiment



<https://doi.org/10.3390/metabo14010073>

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1. Introduction
Carbohydrate-restricted diets, especially ketogenic diets (KD) hold promise for the treatment of obesity-related chronic health conditions, such as type 2 diabetes, as well as for other conditions less related to obesity, including of epilepsy [1], neurodegenerative diseases [2] and mental health conditions [3], polycystic kidney disease [4], and so on. Clinical use cases for KD are rapidly expanding. However, this dietary strategy may cause elevated LDL-cholesterol (LDL-C), a risk factor for atherosclerotic cardiovascular disease

of high-intensity statin therapy in an LMHR subject on a ketogenic diet. This dramatic metabolic demonstration, consistent with the lipid energy model, should provoke further research and not be seen as health advice.

Keywords: carbohydrates; ketogenic diet; LDL cholesterol; lean mass hyper-responder; lipid energy model

number, NCT00017953.)

145

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Look AHEAD Research Group New Engl J Med 2013

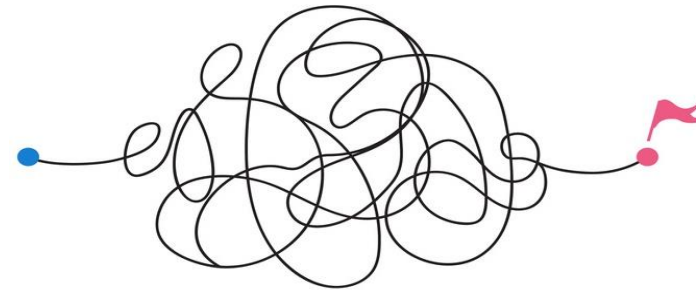
Silly

Science

Options to Navigate this New Environment to Provide Evidence-based Care



Read all literature →



Causes of the Problem

- Predatory Journals
 - Exploit authors (researchers) \$\$\$ to publish & poor peer review
- Academic Paper Mills (heavy AI presence)
 - Publish fake or weak research; \$\$\$ for authorship & poor peer review
- Pay-to-Publish/Open Access/Pre-print servers
 - Depending on publisher, may be little or no peer review
 - EASY to publish extreme/overblown conclusions with media attention
- Unethical Authors
 - Pressure to publish, prestige, promotions, etc



Known issues ... unknown solutions.

Places burden on readers need to stay educated and vigilant.

Flood of Fake Science Forces Multiple Journal Closures - WSJ

5/15/24, 9:05 AM

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<https://www.wsj.com/science/academic-studies-research-paper-mills-journals-publishing-f5a3d4bc>

EXCLUSIVE

Flood of Fake Science Forces Multiple Journal Closures

Wiley to shutter 19 more journals, some tainted by fraud

By *Nidhi Subbaraman* [Follow](#)

May 14, 2024 at 8:00 am ET



nature

[nature](#) > [career feature](#) > [article](#)

CAREER FEATURE | 15 May 2024

I'm worried I've been contacted by a predatory publisher — how do I find out?

Researchers frequently receive invitations to publish in journals that they might not have heard of. *Nature* asked two scientists how they would check whether a publication is legitimate.

By [Nikki Forrester](#)

https://www.nature.com/articles/d41586-024-01437-2?WT.ec_id=NATURE-202405&sap-outbound-id=18EFFFAC444A426C0881B9ABF29421874D41058E

<https://www.wsj.com/science/academic-studies-research-paper-mills-journals-publishing-f5a3d4bc>

Quick heuristics

1. Read primarily **high-impact journals & society journals**

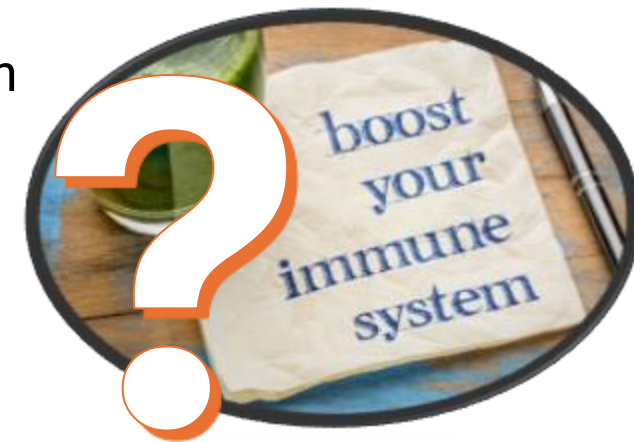
- Examples:
 - Academy: Journal of the Academy of Nutrition & Dietetics (JAND)
 - American Society for Nutrition
 - The Journal of Nutrition (JN)
 - The American Journal of Clinical Nutrition (AJCN)
 - Advances in Nutrition (AN)
 - Current Developments in Nutrition (CDN)
 - American Society for Parenteral & Enteral Nutrition (ASPEN)
 - Journal of Parenteral & Enteral Nutrition (JPEN)
 - Annual Review of Nutrition, Nature, Metabolism, Cell, JCI
 - The Obesity Society (TOS) - Obesity

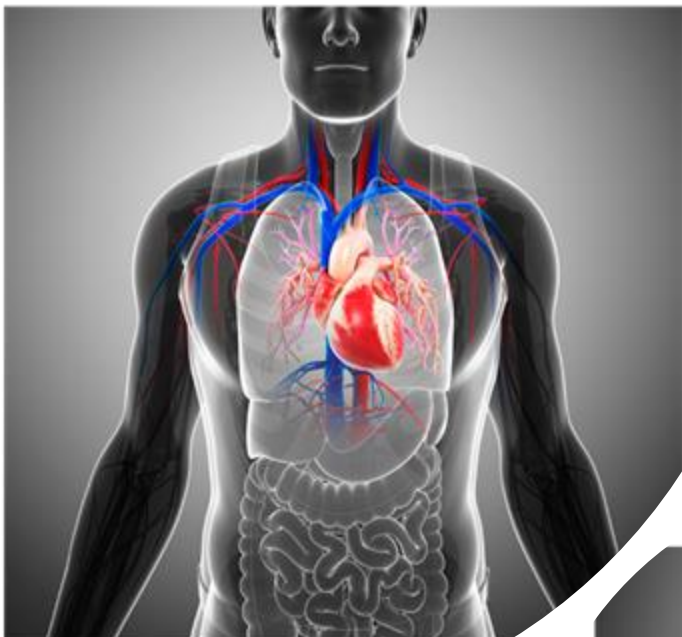
2. Read **Position Statements** of Professional Practice Groups, Specialized Working Groups or relevant Societies

- AND, Am Diabetes Assoc, Am Heart Assoc

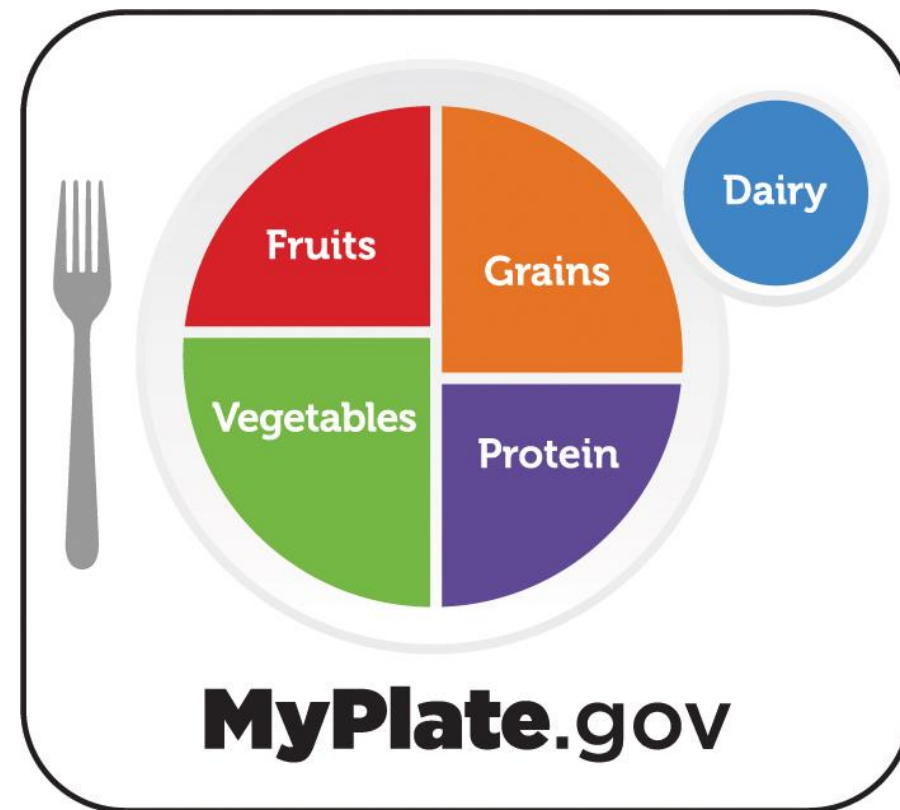
Dietary Factors That Affect Innate and Adaptive Immunity

- Innate – 1st line defense
 - Physical (skin)
 - chemical (enzymes)
 - immunological (natural killer cells)
- Adaptive – 2nd line defense
 - Mediated by B and T cells
 - antibodies to neutralize pathogens
- Dietary factors support immune system.
 - Healthy diet aligning with national guidelines provides adequate nutrition
 - Supplementation may provide additional benefit
 - Dietary factors of interest:
 - Vitamin C
 - Vitamin D
 - Zinc
 - Iron
 - Probiotics
 - Botanicals/Herbals





Established
Nutrition
Evidence



Vitamin C



- Critical roles in both innate and adaptive immunity
 - B and T-cell function
- Antioxidant
- Deficiency impairs immune function & increases susceptibility to viral infection (Carr 2017 Nutrients)
- Supplementation (~500 mg/d) protects against
 - Viral respiratory infection (Hemila 2004 Mil Med)
 - Common cold in harsh stressful conditions (Douglas 2007 Cochrane Database Syst Rev)
 - Regular supplementation may decrease cold symptoms & reduce duration
 - ***NOT shown to be effective after cold symptoms start (Krause and Mahan's Food and the Nutrition Care Process)
- For COVID?
 - Retrospective chart review in ICU pt (Krishnan 2020 J Clin Anesth)
 - Self-report supplement use (Louca 2021 BMJ Nutr Prev Health)
 - Multi-center RCT in ambulatory pt (Thomas 2021 JAMA Netw Open)
 - Critically ill COVID, no effect on mortality, but ↓ thrombosis (Al Sulaiman 2021 Scv Rep)

Insufficient evidence to support vitamin C supplementation for the prevention or treatment of COVID-19 or PASC

Vitamin D

- Critical roles in both innate and adaptive immunity
 - Metabolites & activation
- Cold/Flu: Low vit D = more likely to get respiratory infection & more severe symptoms
- Supplementation (400-2000 IU/d) reduces viral infection (Jolliffe 2021 Lancet Diabetes Endocrinol)
- COVID-19: Low vit D = ↑ disease severity & mortality risk (Nicoll 2022 J Clin Med)
- Suppl. D: Reduction of COVID-19 severity & mortality risk (D'Ecclesiis 2022 PLoS ONE)



Insufficient evidence to support vitamin D supplementation for the prevention or treatment of COVID-19 or PASC in healthy individuals, but there may be benefit for patients that present with poor vitamin D status.

Zinc

- Required for enzymatic reactions in innate & adaptive immunity, including antiviral defense mechanisms
- Deficiency = compromised immune system
 - direct ramifications for immune cell function (Justiz Vaillant 2022 Immunodeficiency)
- Within 24 hrs cold onset ($\sim 75+$ mg/d) = reduced duration & severity of cold symptoms
 - Taken in **lozenge or syrup form** (theory: related to physical contact with rhinovirus in those areas)
 - Does NOT reduce risk of infection
 - Dose is ABOVE the DRI Tolerable Upper Intake Level (UL); not recommended for chronic dose
- COVID-infected have lower serum zinc (Children (Dogan 2022 J Trop Pediatr) & Adults (Elham 2021 Clin Nutr ESPEN))
- Supplementation for COVID
 - Ineffective (Thomas 2021 JAMA Netw Open) & Negative side effects (Cu deficiency & med absorption)



Insufficient evidence to support zinc supplementation for the prevention or treatment of COVID-19 or PASC.

Due to potential negative effects, supplementation is not recommended.

Iron

- Required for critical enzyme function of immune cells
 - neutrophils and lymphocytes
- Deficiency = ↑ risk of general infections (Tom Nutritional Biochemistry 1999)
- Excess iron levels also ↑ the risk of infection in critical care (Litton 2019 Crit Care)



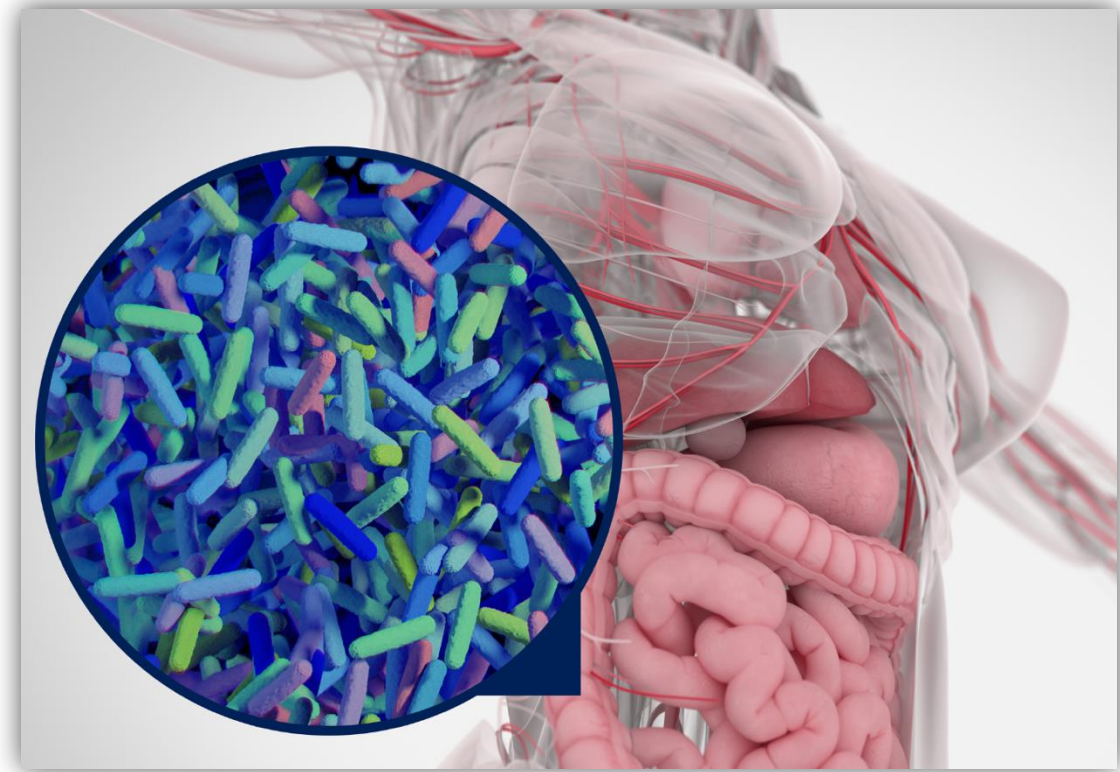
Why an interest in COVID?

- COVID-19 impacts iron homeostasis (Sonnweber 2020 Respir Res)
- 1 report, iron levels were associated with COVID-19 severity (Hippchen 2020 Hemasphere)
- Theory: iron depletion therapy as a treatment strategy for COVID-19 due to its antiviral effect (lack of empirical data)

Iron supplementation for COVID-19 in otherwise healthy individuals is not warranted.

Gut Microbiome

- Independent role in immune function
- Billions of living microorganisms
 - Highly variable between individuals
 - Dysbiosis: imbalance in microorganisms
 - associated with disease
- Responsive to diverse stimuli
 - Diet
 - Drugs
 - Exercise
 - Environment
 - Probiotics
 - Fermented foods
 - Medications
 - Dietary supplements





In addition to MyPlate nutrition goals:

Probiotics:

- Living micro-organisms
- Contribute to gut microbiome (supplement???)
- Fermented foods
 - Greek yogurt, sauerkraut, pickles
 - Kefir, kimchi, kombucha, miso

Prebiotics:

Feed gut microbiome

- Typically indigestible portions of food
- >30 different species of plant foods per week
 - Fruits, veggies, grains, beans, nuts



Probiotics

- Reduce viral infections (Hao 2015 Cochrane Database Syst Rev)
 - Including respiratory viruses (Saeterdal 2012 Glob Adv Health Med)
- Improves both innate and adaptive immunity (Shi 2021 Eur J Nutr)
- Emerging data connects gut microbiome & lung diseases (Zhang 2020 Front Microbiol)
 - Resolving dysbiosis provides clinical benefit in lung diseases (Budden 2017 Nat Rev Microbiol)
- Relevant to COVID?
 - Supplementation in mild COVID reduced fatigue (Rathi 2021 Medicines)
 - Adjuvant therapy in severe COVID (d'Ettorre 2020 Front Med)
 - Reduced GI & pulmonary symptoms
 - Reduced risk of ICU admission
 - Reduced mortality
 - Dysbiosis may play causative role in COVID severity (Venzon 2022 bioRxiv)
 - Dysbiosis associated with persistence of PASC (Liu 2022 Gut)
 - **2 months nutrition intervention improves PASC symptoms** (Wang 2022 mBio)
 - Appetite, nausea, anxiety, heart palpitations



Probiotics seem promising...

- Maintaining a healthy gut microbiome supports both innate and adaptive immunity
 - May reduce risk of infection, symptom severity & duration (esp. children)
 - May combat COVID-19, PASC, and related symptoms
 - Safe
- Nutritional approaches
 - Eating a wide variety of foods across food groups (>30 species of plants/week)
 - Focus on fermented foods, such as yogurts and sauerkrauts
 - Aligns with national dietary guidelines
- Supplementation to combat COVID-19 and PASC?
 - Caution required due to limited evidence.
 - Requires replication in large, diverse populations.

Botanicals & Herbals

- Botanicals can have MAJOR effects on health.
 - E.g., Metformin
 - Front-line medication and effective diabetes therapy
 - Botanical from the French Lilac.
- Common Botanicals & Herbals for Immune Support:
 - Andrographis
 - Echinacea
 - Elderberry
 - Garlic
 - Ginseng
 - Green Tea & tea catechins (epigallocatechin gallate; EGCG)



Botanicals to combat Common cold, influenza, & other respiratory tract infections

Botanical	Efficacy	Dose	Notes/Caveat
Andrographis	significantly reduced the severity of cough, sore throat, and overall symptoms	200 to 1,200 mg, 3 to 7 days	Different formulations; clinical trials affiliated with manufacturer

Key Resource!



ods.od.nih.gov

U.S. Department of Health & Human Services > National Institutes of Health > Division of Program Coordination, Planning, and Strategic Initiatives

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1 2 3 4 5

Beyond individual nutrients – we learned a lot from COVID



Review

The Role of Nutrition in Mitigating the Effects of COVID-19 from Infection through PASC

Jacob T. Mey , John P. Kirwan  and Christopher L. Axelrod *

Pennington Biomedical Research Center, 6400 Perkins Road, Baton Rouge, LA 70808, USA

* Correspondence: christopheraxelrod@pbrc.edu

In case you forgot ...

COVID19 pandemic c.a. 2020

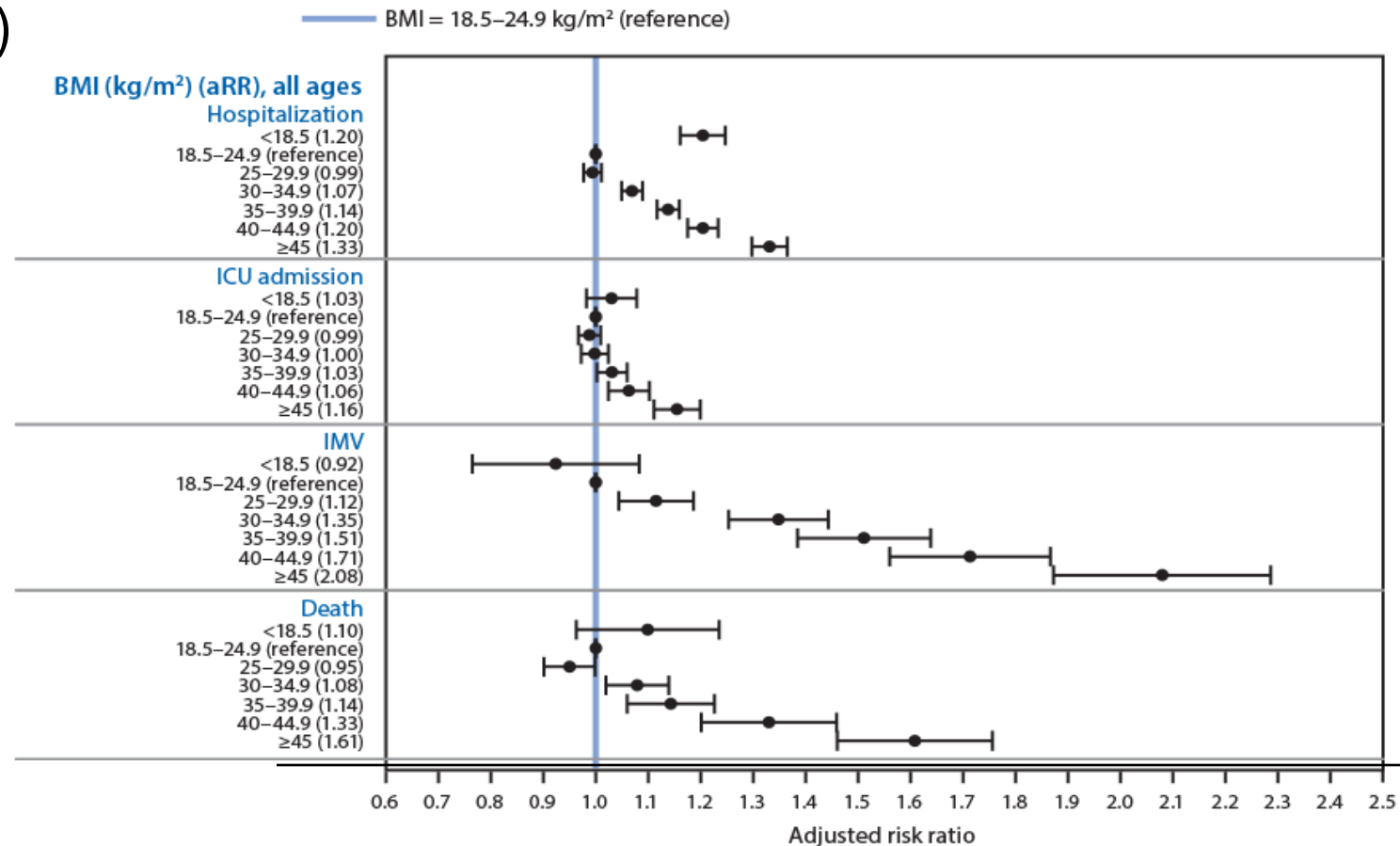
- Also “long-COVID”
 - Prolonged symptoms beyond 3 months
 - aka post-acute sequellae of COVID (PASC); symptoms:
 - Respiratory: congestion/cough
 - Physical: fatigue, muscle pain, chest pain
 - Mental: confusion, lack of wakefulness



Over/Undernutrition Affects Immunity, Too!

- Manifests in unhealthy BMI
 - Overweight (BMI >25 kg/m²)/obesity (BMI >30 kg/m²)
 - Underweight (BMI <18.5 kg/m²)

148,494 U.S. adults with COVID



aRR = adjusted risk ratio

ICU = intensive care or stepdown unit

IMV = invasive mechanical ventilation

*Image modified from: Kompaniyets 2021 MMWR Morb. Mortal. Wkly Rep.

Over/Undernutrition

Negative impact of obesity consistent across similar investigations.

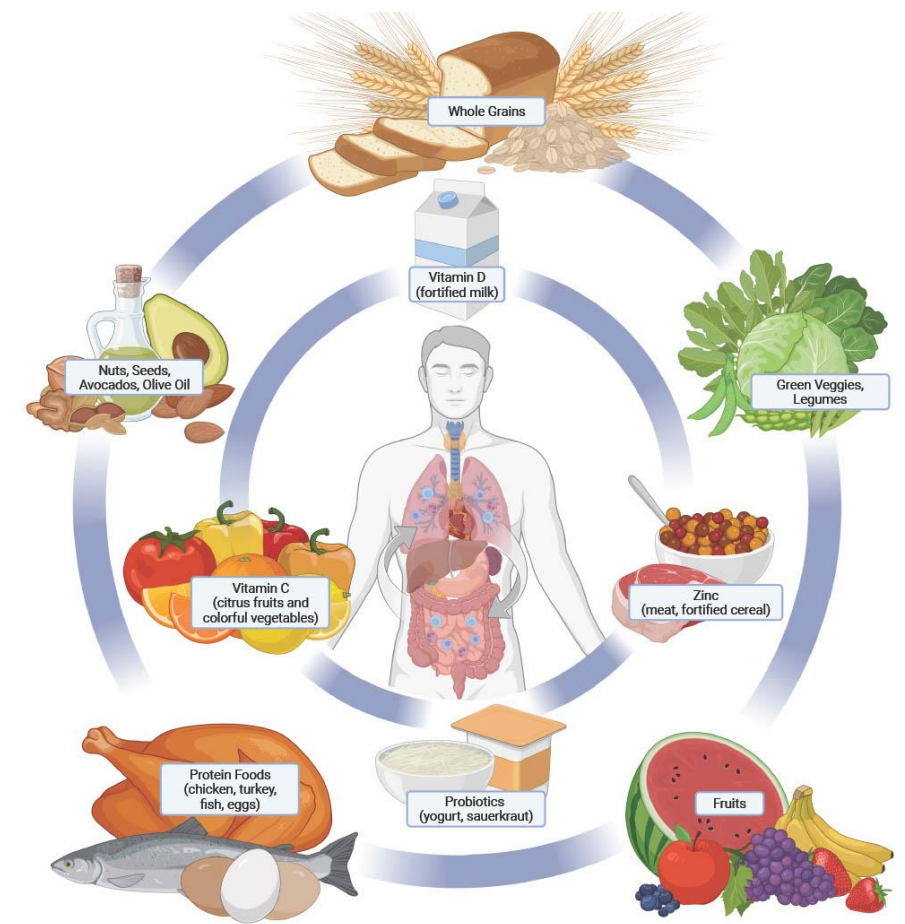
Translates to flu, too.
(Shaikh Annu Rev Nutr 2022)

Author	Year	# of Participants	BMI category (kg/m²)	Relative Risk (mortality)	Notable Items
Kompaniyets	2021	148,494	30-34.9	~1.1	MMWR Morb. Mortal. Wkly Rep
			35-39.9	~1.1	
			40-44.9	~1.2	
			45+	~1.3	
Tartof	2020	6,916	30-34.9	~1.3	Ann. Intern. Med; more prominent in young vs old, patients from southern California, risk of death at 21 days.
			35-39.9	~1.3	
			40-44.9	~2.7	
			45+	~4.2	
Anderson	2020	3,466	30-34.9	~1.1	Ann. Intern. Med; more prominent in young vs old
			35-39.9	~1.3	
			40-44.9	~1.6	
			45+	n/a	
Bennett	2021	174,568	30-34.9	~1.4	JAMA Netw. Open; National COVID Cohort Collaborative
			35+	n/a	

Nutrition for Immunity

1. Maintain a healthy body weight
2. Consume a nutritious diet
 - adequate micronutrients
3. Support microbiome

- Accomplished following national dietary guidelines.
- Flu/Cold: Vit C & D daily for prevention, short-term Zinc for acute tx.
- COVID: Supplementation with micronutrients/minerals not warranted.
 - Potential role for endurance athletes or at-risk individuals
- Supplementation with probiotics promising, but requires more data. Diet 1st.
- Botanicals: weak evidence, weigh pros/cons on individual basis



Effective strategies to improving BMI



Lifestyle (with RD support)

Look AHEAD Research Group 2013 NEJM
Tewksbury 2022 JAND

Pharmacology

SUSTAIN, PIONEER, SURMOUNT, STEP trials



Metabolic Surgery

STAMPEDE Investigators 2017 NEJM

Anti-Stigma, Pro-Science Commentary



- **Context** – anti-obesity rhetoric was used in news outlets to place blame on outcomes to individuals with obesity.
- it is increasingly important to recognize & reinforce that:
 - (1) obesity is a disease with clearly defined causative biological underpinnings
 - not a disorder of choice, laziness, or lack of personal motivation for self-care
 - (2) social stigmatization is harmful to individuals impacted by the disease and perpetuated by bias in medical care

Key Resource!



Rubino 2020 Nat Med “**Joint international consensus statement for ending stigma of obesity**”

**Critical to use accurate and sensitive terminology:
Person-first language e.g., “person with obesity”**

Key Resource!



FROM THE ACADEMY



Position of the Academy of Nutrition and Dietetics: Medical Nutrition Therapy Behavioral Interventions Provided by Dietitians for Adults With Overweight or Obesity, 2024



Hollie A. Raynor, PhD, RD; Maria Morgan-Bathke, PhD, MBA, RD, FADN; Suzanne Domel Baxter, PhD, RD, LD, FADA, FAND;
Tanya Halliday, PhD, RDN; Amanda Lynch, PhD, RDN; Neal Malik, DrPH, MPH, RDN; Jessica L. Garay, PhD, RDN, FAND;
Mary Rozga, PhD, RDN

Recent Findings on Vegan & Ketogenic Diets

nature medicine



Article

<https://doi.org/10.1038/s41591-023-02761-2>

Differential peripheral immune signatures elicited by vegan versus ketogenic diets in humans

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Amber B. Courville⁶ , **Shreni Mistry⁷**, **Andrew Burns⁷**, **Richard Apps²**,
Kevin D. Hall⁶  & **Yasmine Belkaid^{1,2}** 

Overview

Conducting controlled human trials on nutrition & immunity has challenges

- Diet intake
- Self-reporting diet & activity
- Exposures

Inpatient study – patients live in a controlled research setting, allowing strict control & monitoring of diet, activity, sleep, etc

Diets: ketogenic diet (low-carb, animal-based) and a vegan diet (low-fat, plant-based)

Outcomes: Immune system changes within a short timeframe.

20 adults, four-weeks (2 weeks on each diet)

1st - What is a research-grade ketogenic diet?

Comprehensive, nutrient-dense, high variety vs “Bacon, Butter & Beef”



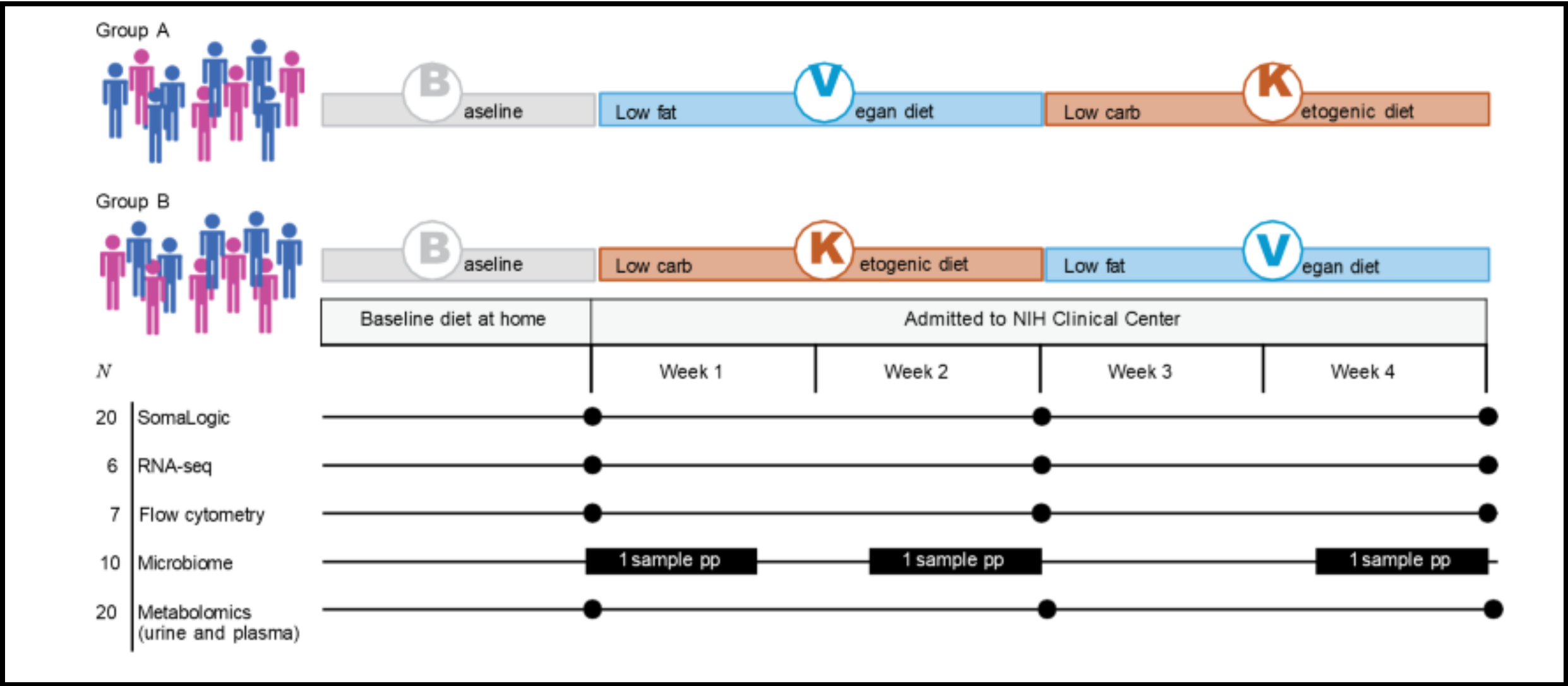
VS



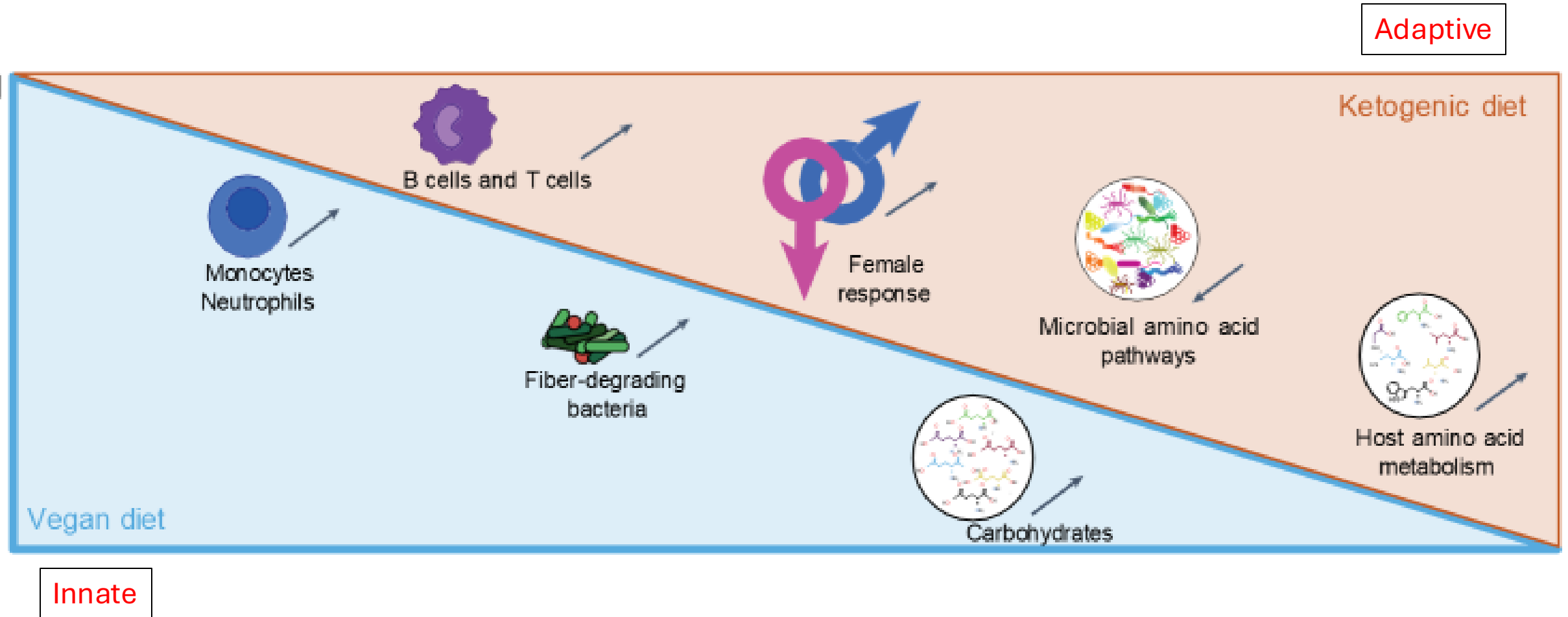
Gardner CD J Am Med Assoc 2018; Am J Clin Nutr 2022

Lennerz Curr Dev Nutr 2022

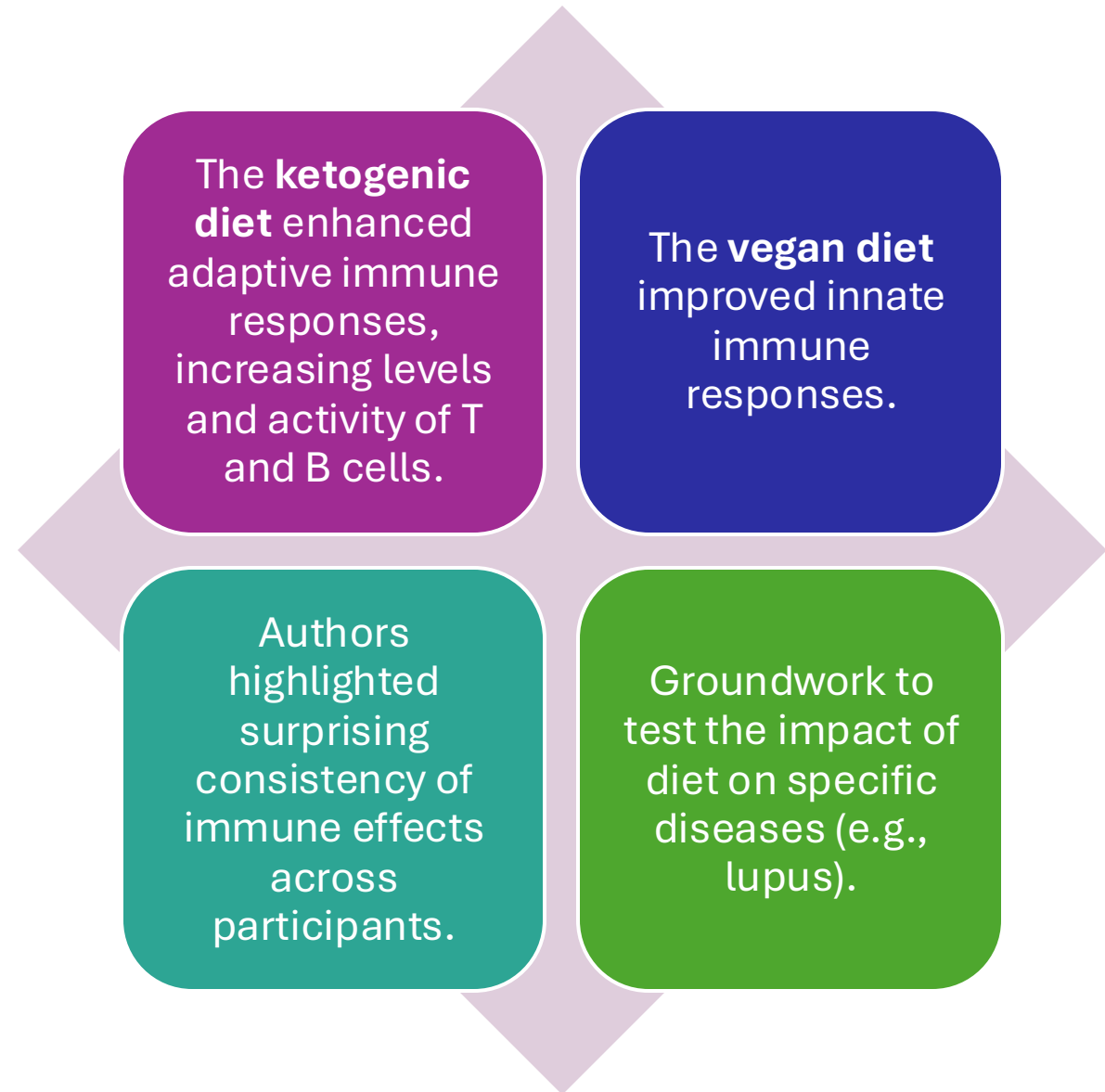
Methods: Highest Quality Approach to Date!

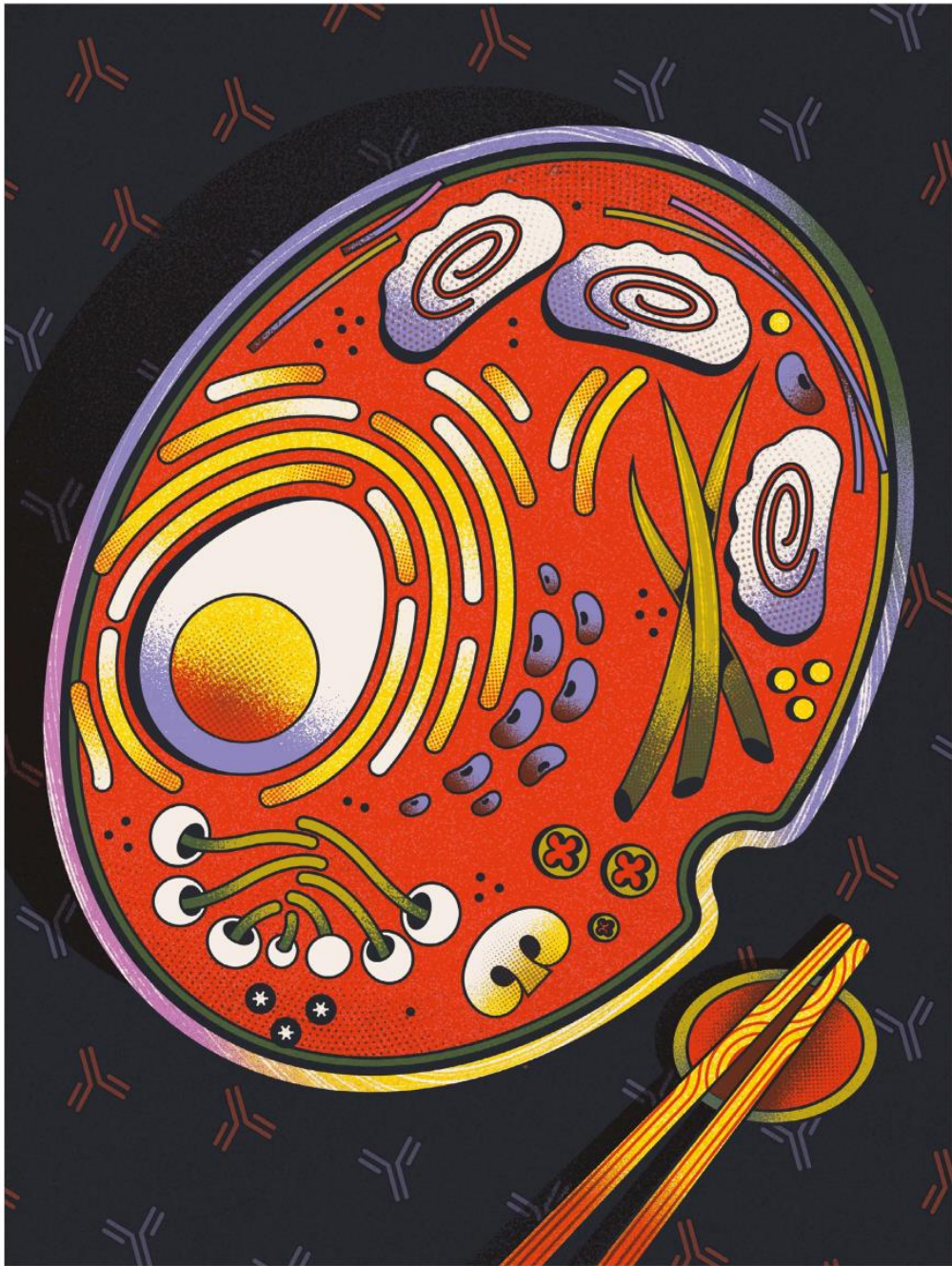


Graphical Summary



Key Results





Awesome Commentary on the State of the Field

CAN YOUR DIET CONTROL YOUR IMMUNE SYSTEM?

• By Nic Fleming

Nic Fleming: Interview & Comments from Authors



Research is increasing into the role of diet in boosting immunotherapy for conditions like cancer. For instance, higher fiber intake has been linked to improved immunotherapy outcomes for melanoma patients.



Growing optimism among immunologists for personalized diets designed to enhance immune system function for various medical conditions.



Visionary future: rigorous dietary advice with clinical applications becomes widely available, unlocking significant health benefits.



Implementing These Findings in Clinical Practice



Advising Patients on Immune Health and Nutrition



Practical diet
recommendations for
patient/client



Emphasizing individualized
approaches

Supplement vs not to
supplement



Use “5 star” resources for
patient education as
advertising tools

Quick Summary Points

- Nutrition can have a profound effect on immune system
- Start with nutrition basics
 - MyPlate + Pre/Pro-biotics
- Supplementation individualized to patient/client
 - C & D daily during flu season & zinc upon onset (personal rec)
 - Botanicals: Balance pros/cons
 - Recommend supplement safety practices
- COVID-specifics remain largely unknown due to lack of trials
- Dietary pattern may have independent immune effect (keto, vegan, etc)
- MUST critically evaluate not just WHAT you read but WHERE you read it

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