

Our ancestral human diet

Should it be a paradigm for contemporary nutrition?

- **Modern man emerged over 200,000 years ago**
- **Human genome has remained unchanged**
- **Genetically we are adapted to the foods present 200,000 years ago.**
- **Fruits and vegetables, provided greater than 50% of energy intake, Americans today consume less than 16%.**
- **High plant-based dietary intake made ancestral diets base-yielding, unlike today's acid-producing pattern.**
- **Fiber consumption was estimated to be 100-150 g/day and the average American today consumes less than 10 g/day**

S Boyd Eaton¹

Proc Nutr Soc. 2006
Feb;65(1):1-6. doi:
10.1079/pns2005471

The plant-based diet microbiome

- **More short chain fatty acids than meat eaters**
Protect the intestinal barrier, regulating our immune system and control our appetite and blood sugar
- **Better at suppressing the growth of colon cancer cells**
Butyrate triggers apoptosis of pre-cancerous cells
- **Far lower levels of secondary bile acids**
Secondary bile acids are pro-inflammatory & pro-carcinogenic to our gut lining
- **The plant-based microbiomes lacked the ability to metabolize carnitine (from meat) and choline (from eggs)**
Individuals with elevated serum TMAO are 3.4 times more likely to develop CRC

Angelis M, et al. Diet influences the functions of the human intestinal microbiome. 2020

Bae S, et al. Plasma choline metabolites and colorectal cancer risk in the Women's Health Initiative Observational Study. *Cancer Res.*

Low Fiber High Fat Diet Has Been Associated with Immune Dysregulation

Inflammatory Autoimmune Diseases

- Parkinson's Disease
- Rheumatoid Arthritis
- Multiple Sclerosis
- Irritable Bowel Disease
- Type 1 DM
- Eczema & Psoriasis
- Food Allergies
- Asthma

NCD- Chronic Diseases

- Obesity
- Metabolic Disorders
- NAFLD
- Irritable Bowel
Syndrome and digestive
disorders
- Heart Disease

Immune and Genetic Dysregulation

- Alzheimer's Dementia
- Cancer

EAT PLANTS

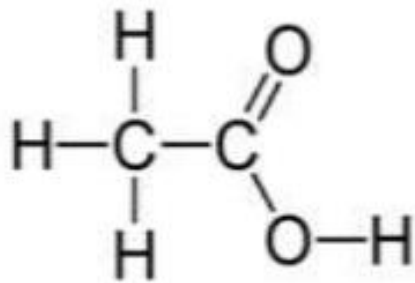


Commensal
Bacteria

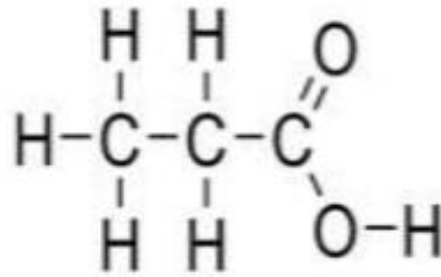
Short
Chain
Fatty
Acids

Short Chain Fatty Acids

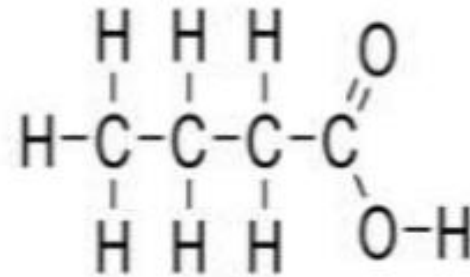
- Beneficial microbiota find fiber from whole plant foods, ferment it, and produce by-products called **short-chain fatty acids**.
- SCFAs have numerous beneficial functions and travel and communicate with different systems in our bodies.
- 90% of SCFAs are metabolized by the microbiota for energy or absorbed by intestinal cells
- A smaller % is circulated through peripheral circulation to other tissues
- SCFA's serve as 10% of daily caloric requirements for humans



Acetic acid (acetate)



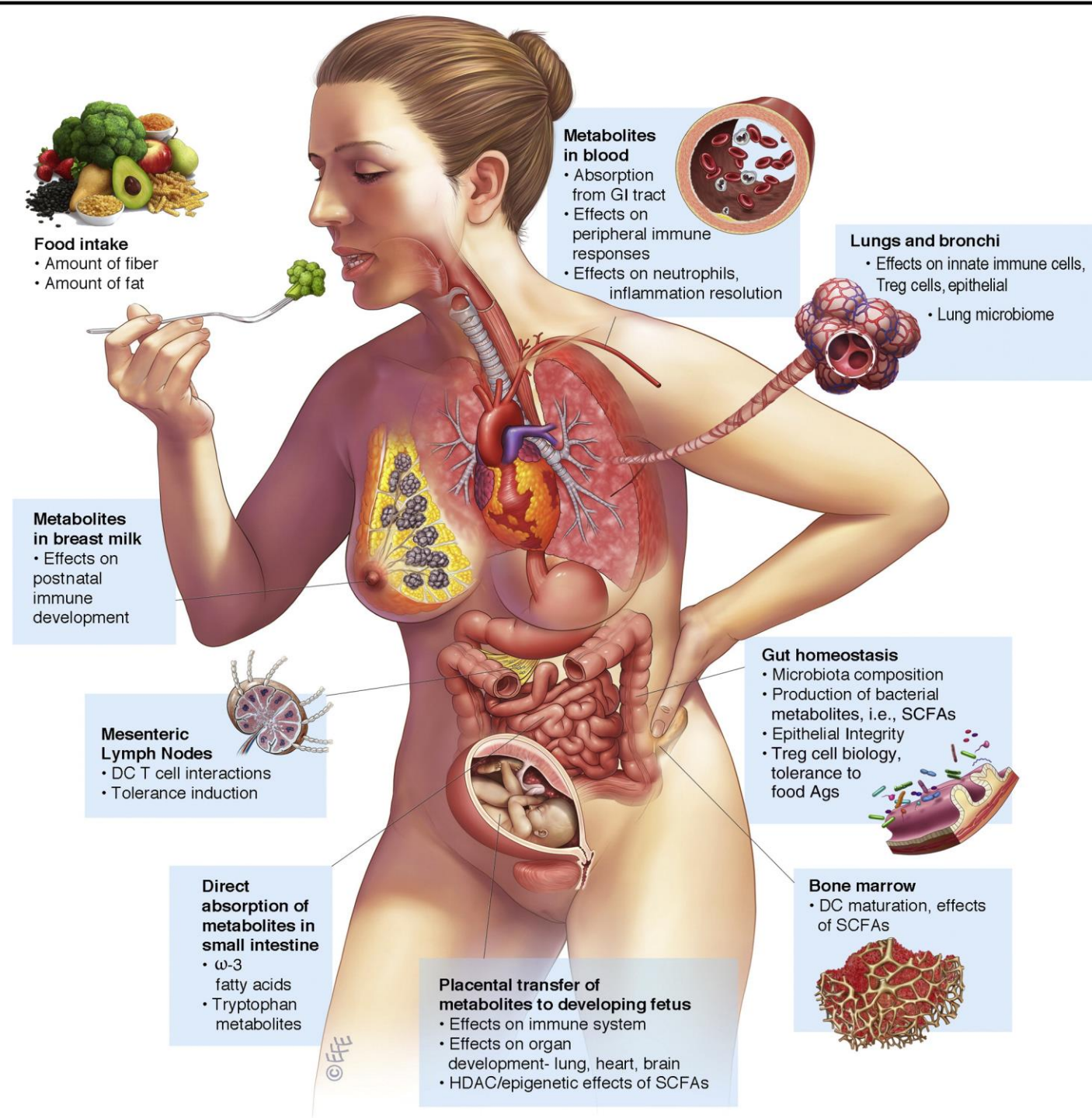
Propionic acid (propionate)



Butyric acid (butyrate)

- **Short-chain fatty acids (SCFAs) are important for overall health maintenance.**
- **SCFAs have an important role in lipid and glucose metabolism homeostasis.**
- **SCFA cross the BBB and regulate neurotransmitters.**
- **SCFAs can modulate immunological activity.**

Systemic Effects of SCFA



The Impact of Dietary Fiber on Gut Microbiota in Host Health and Disease

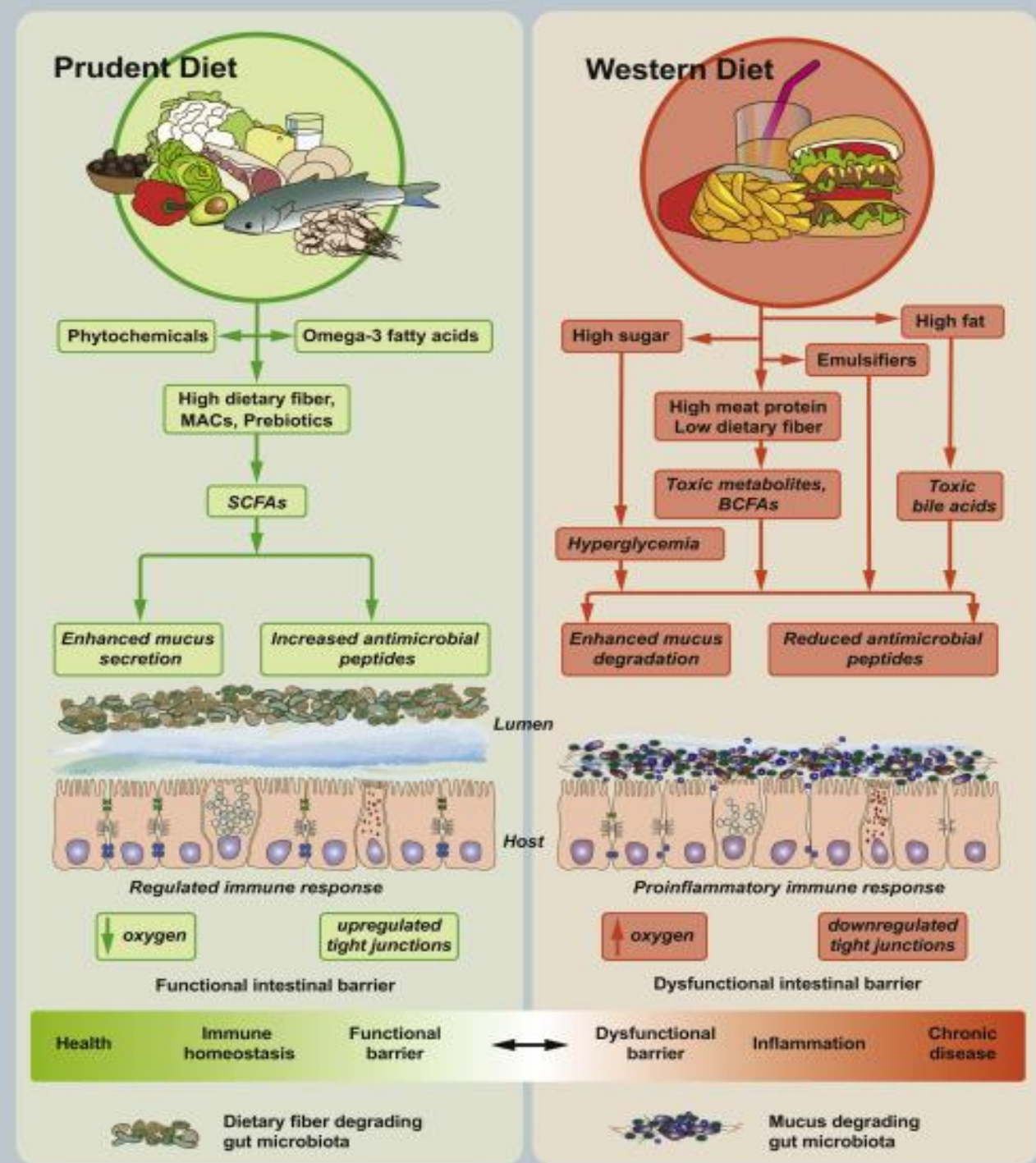
Type, quality, and origin of our food shape our gut microbes and affect their composition and function, impacting host-microbe interactions.

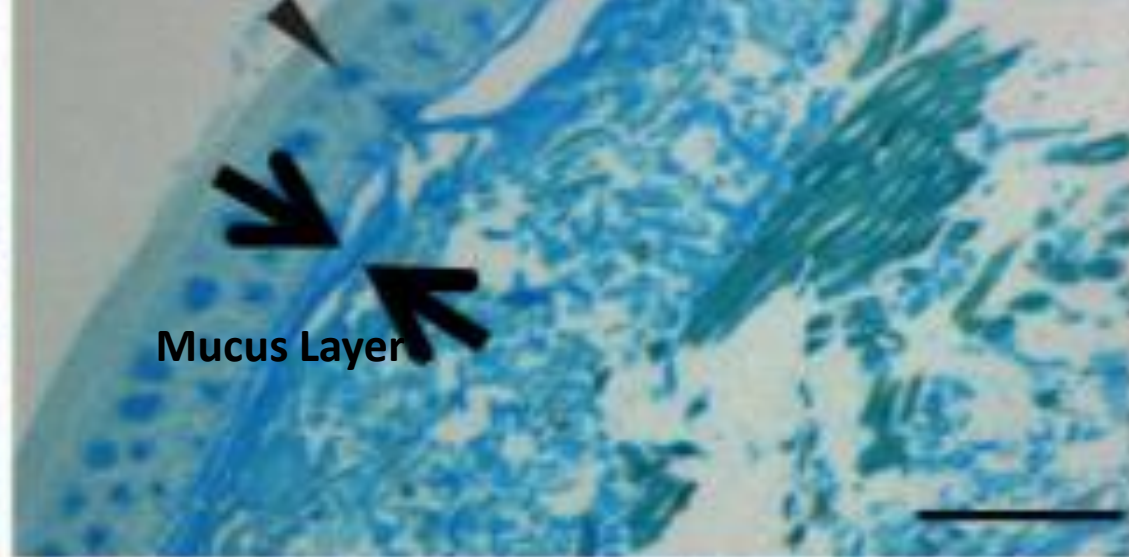
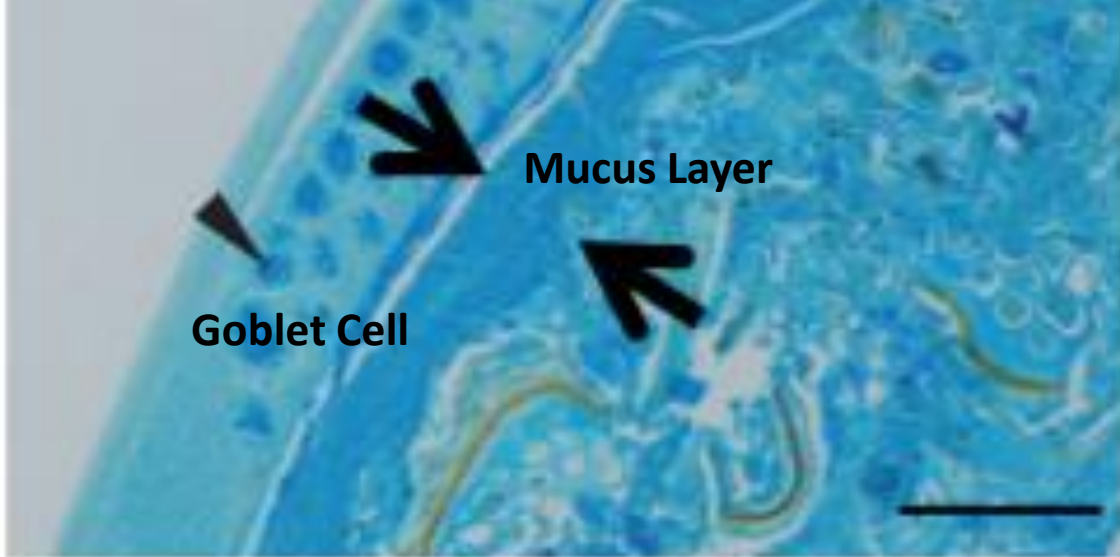
- Enhance mucous and anti-microbial function
- Increase tight junction proteins
- SCFA reduce oxygen levels
- SCFA maintain functional immune system

Alterations in this ecosystem lead to Increased susceptibility to

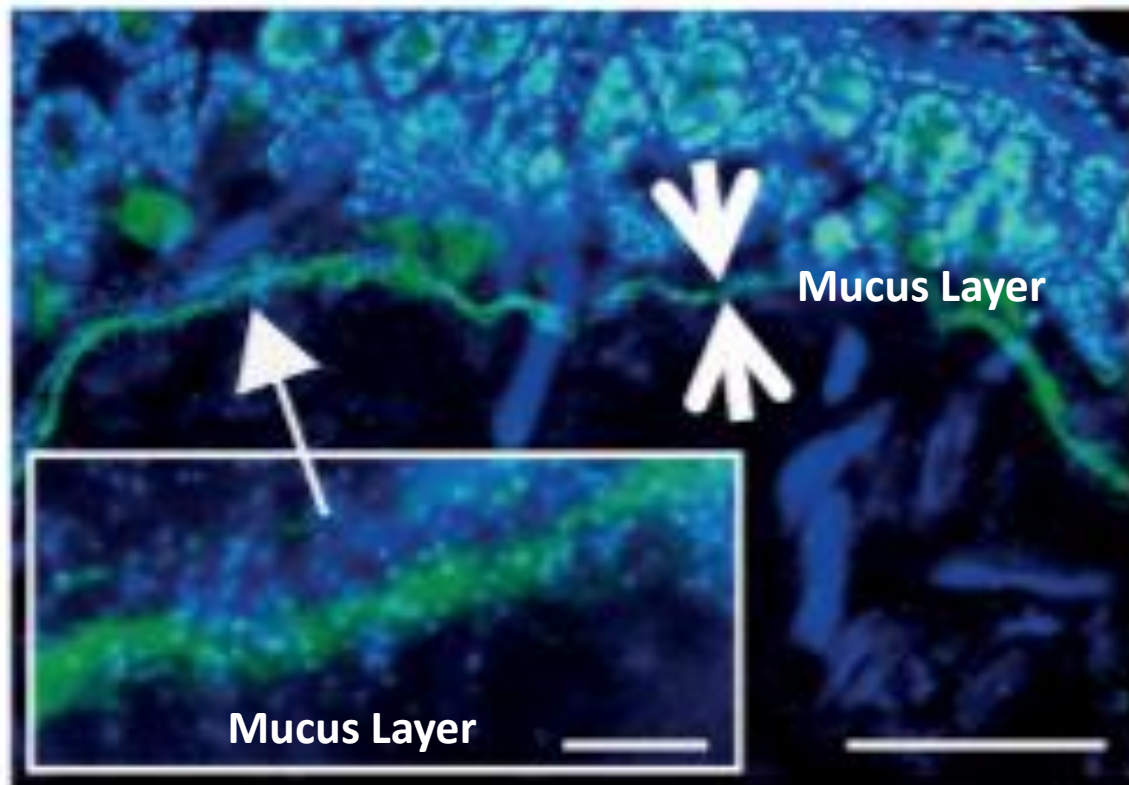
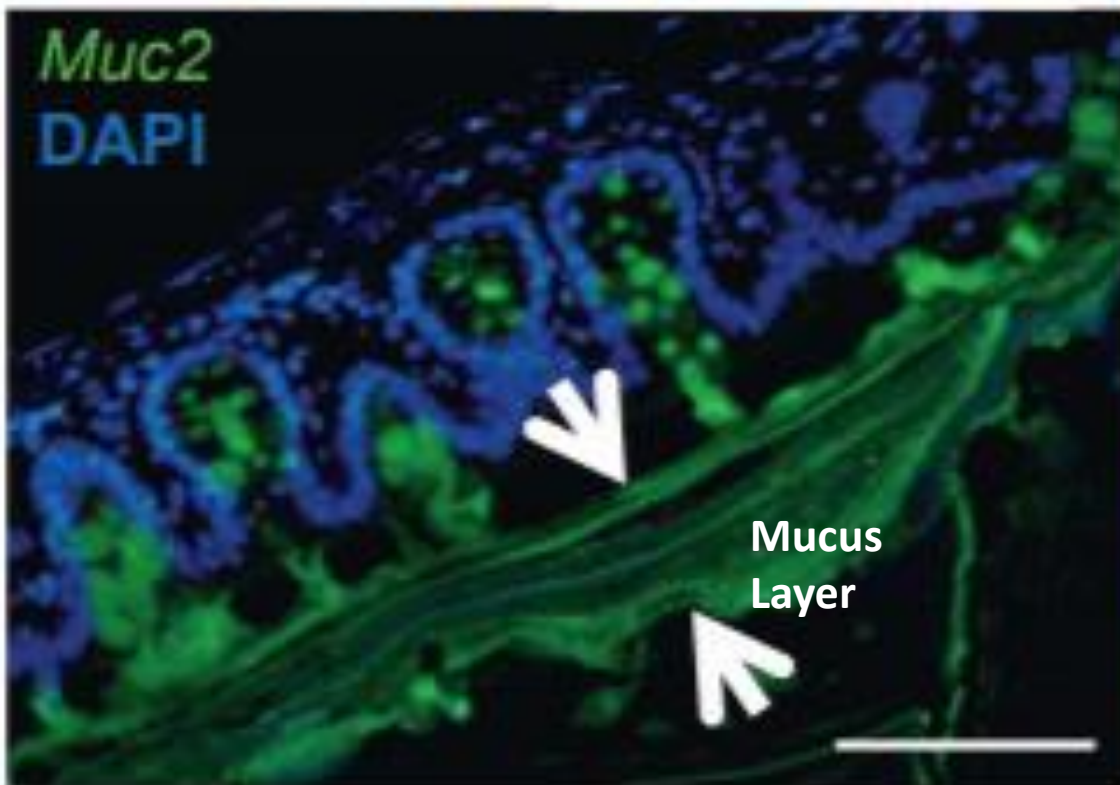
- Infection
- IBD
- CRC

Cell Host & Microbe 23, June 13, 2018





B



Fat, Fiber and Cancer Risk in African Americans and Rural Africans

Plant-based diet rapidly reverses harmful changes

Within 14 days of switching from Standard American Diet to high-fiber plant-based diet:

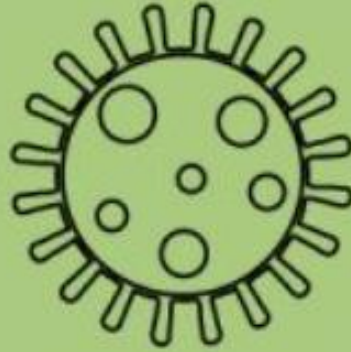
“Remarkable reciprocal changes in mucosal biomarkers of cancer risk in aspects of the microbiota and metabolome known to affect cancer risk”

- More beneficial SCFAs
- Less carcinogenic secondary bile acids
- Reduced mucosal proliferation rate





**Increase microbiome diversity
and abundance by consuming
greater than
30 different plants per week**



prebiotics

Fibers that feed
good bacteria

probiotics

Live beneficial bacteria
in your gut

postbiotics

Metabolites produced
by good bacteria

Probiotics

Fact Sheet for Health Professionals

<https://ods.od.nih.gov/factsheets/Probiotics-HealthProfessional/>

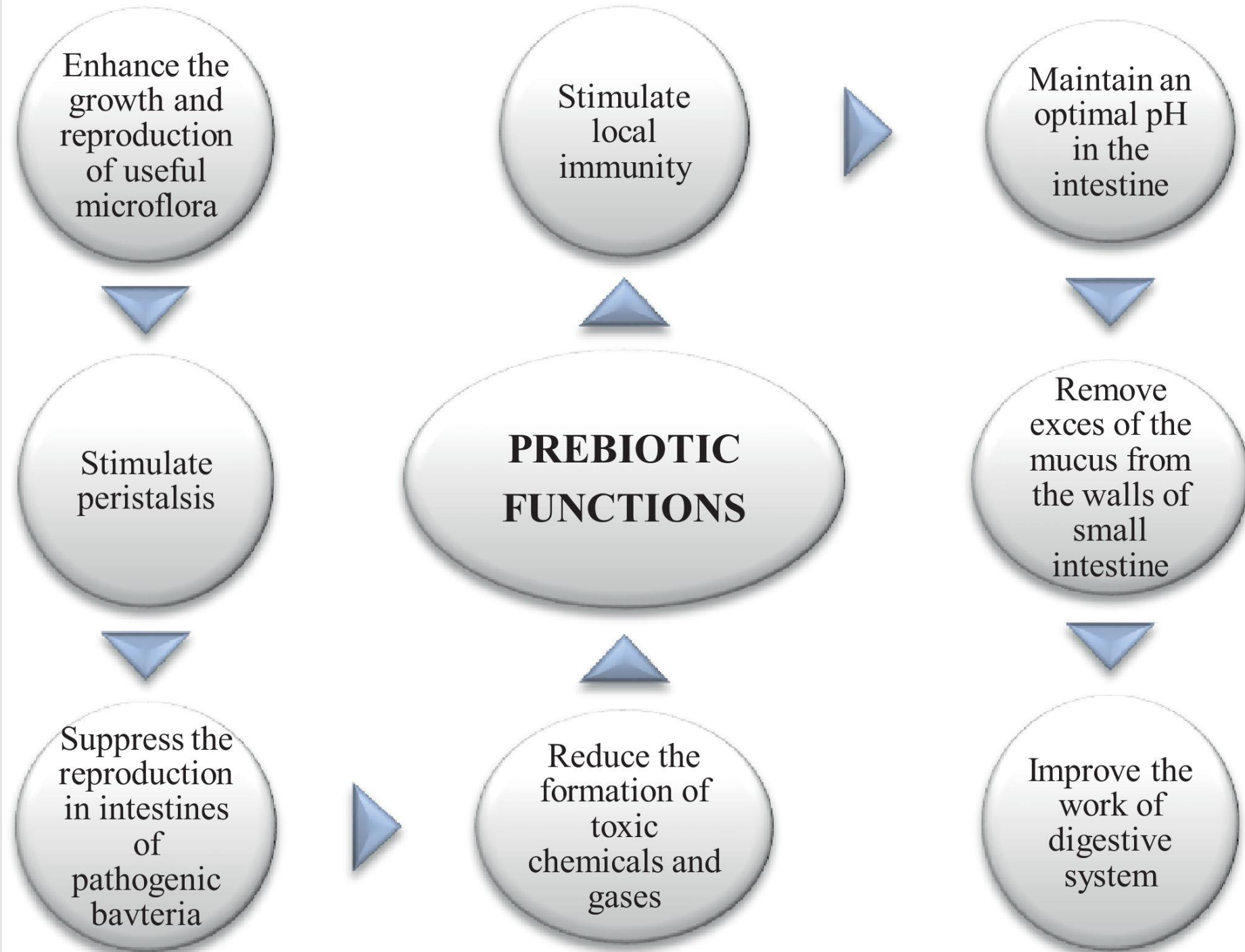
There are currently no formal recommendations for or against the use of probiotics in healthy people. However, some expert bodies of health professionals provide guidance on the use of specific probiotic strains in people with certain health conditions. These groups also offer guidance for clinicians and consumers on choosing probiotic products.

[U.S. Department of Health & Human Services](#)

[National Institutes of Health](#)

[Division of Program Coordination, Planning, and Strategic Initiatives](#)

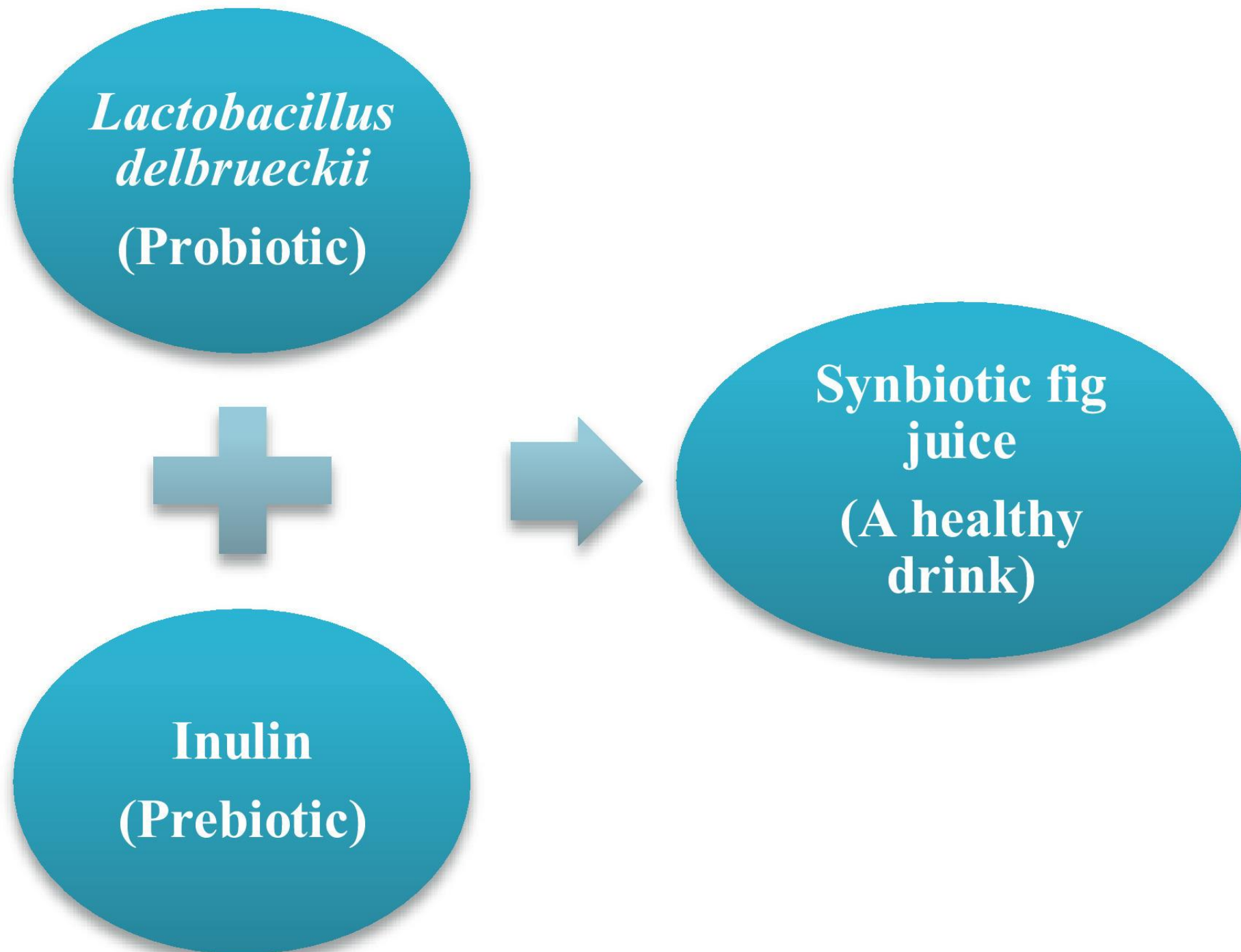
Functions of Prebiotics



Common Classes of Prebiotics

<i>Lactobacillus</i>	<i>Bifidobacteria</i>	<i>Others</i>
<i>L. casei</i>	<i>B. adolescentis</i>	<i>Bacillus subtilis</i>
<i>L. acidophilus</i>	<i>B. animalis</i>	<i>Enterococcus faecalis</i>
<i>L. crispatus</i>	<i>B. asteroides</i>	<i>E. faecium</i>
<i>L. delbrueckii</i>	<i>B. bifidum</i>	<i>E. coli</i>
<i>L. gallinarum</i>	<i>B. bohemicum</i>	<i>Lactococcus lactis</i>
<i>L. gasseri</i>	<i>B. lactis</i>	<i>Leuconostoc mesenteroides</i>
<i>L. johnsonii</i>	<i>B. boum</i>	<i>Pediococcus pentosaceus</i>
<i>L. paracasei</i>	<i>B. breve</i>	<i>P. acidilactici</i>
<i>L. plantarum</i>		<i>Sacchromyces boulardii</i>
		<i>Streptomyces thermophilus</i>

Synbiotics



Synbiotics

Probiotics

Prebiotics

Changes in
intestinal
microbiota

Immuno-
modulation

Effects on
metabolism

Colonizati-
on resistance
and
pathogen
supression

Immune
response
harmonizat-ion
and respiratory
diseases
prevention

Decrease
toxin levels in
the gut and
supply
nutrients and
decrease
serum
cholestrol

Inhibition of
carcinogenesis and
other pathogens

Immunom-
odulation

Intenstinal
microbiota
changes

Effects on
nutrient
absorption

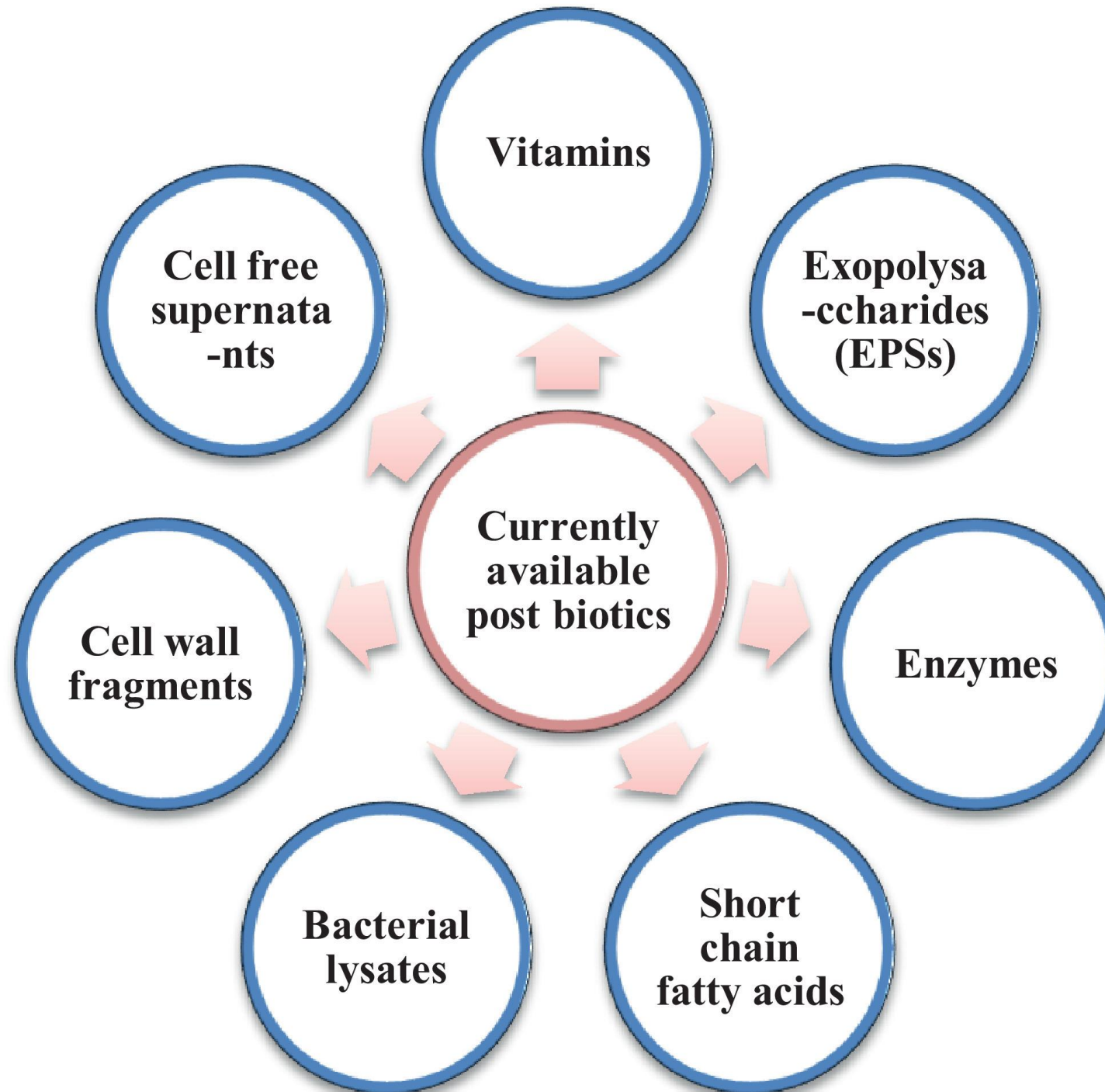
Reduced risk of
tumour and
cancers and
inhibition of
pathogen
infection

Support of
immune
system

Developm-
ent of
beneficial
intestinal
bacteria

Reduced risks
of metabolic
syndrome and
obesity

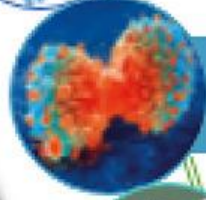
Postbiotics



Postbiotics



Immuno-modulation



Anti-tumor/Anti-proliferative



Pathogen inhibition and infection prevention



Anti-atherosclerotic



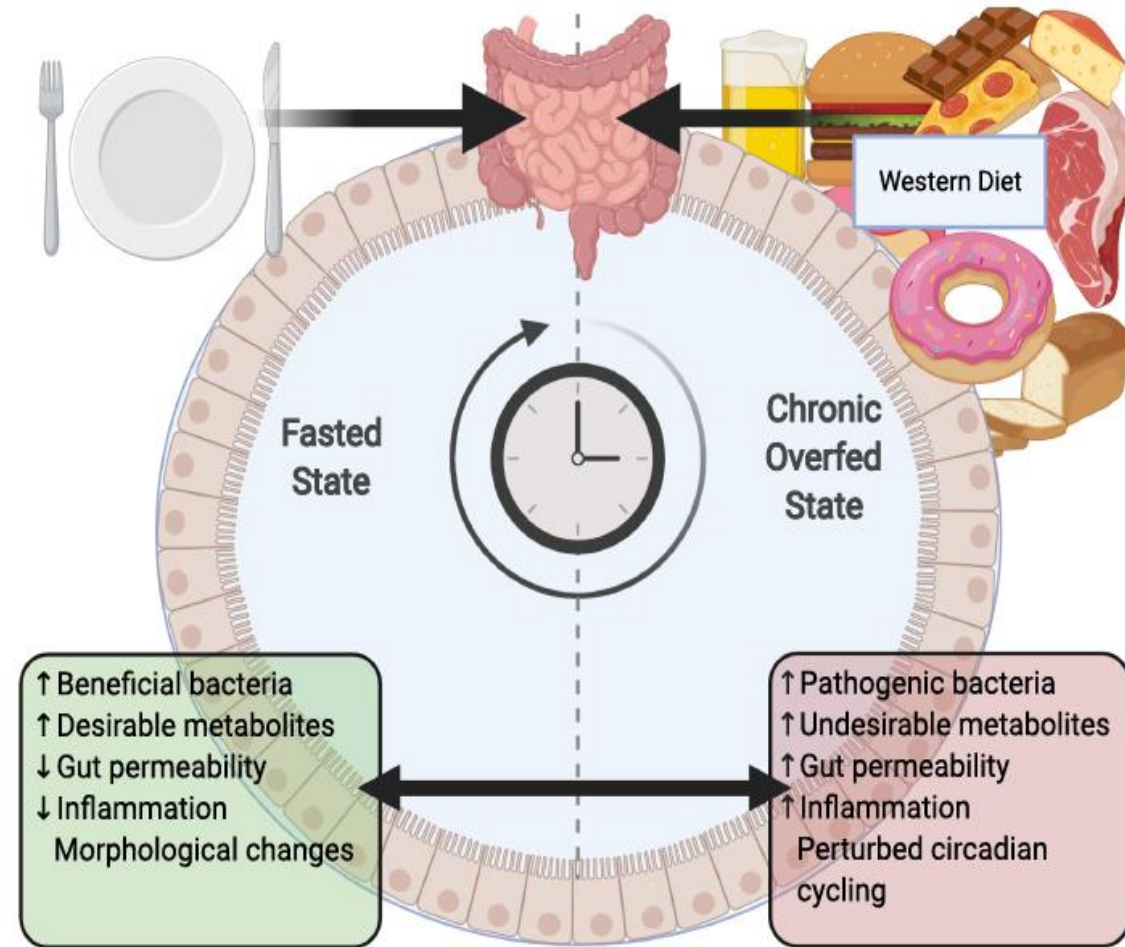
Autophagy



Accelerated wound healing



Metabolic homeostasis



AMERICAN JOURNAL OF PHYSIOLOGY

**GASTROINTESTINAL
AND LIVER PHYSIOLOGY.** © 2021

american
physiological
society

A man with short dark hair, wearing a dark green button-down shirt over a white t-shirt and light-colored trousers, stands on a grassy bank. He has a tan backpack and is holding a pair of black binoculars and two trekking poles. He is smiling and looking across a wide river towards a lush green forest on the opposite bank. The sky is blue with some light clouds.

Whatever you seek in life you
will find.

To change your life, change
what you seek

paraphrase of the Bible verse in Matthew 7:7-8



Microbiome

Lifestyle

Epigenetics DNA



The American College of Lifestyle Medicine

Advancing evidence-based lifestyle medicine to prevent,
treat and reverse non-communicable chronic disease

PhysiciansCommittee for Responsible Medicine

What is the healthiest diet?

Find out what the latest science is saying about your favorite foods to help
you make the healthiest choices for you and your family

Watch our free videos on more than 2,000 health and nutrition topics
with new videos and articles uploaded every day



What is Functional Medicine?

Functional medicine determines how and why illness
occurs and restores health by addressing the root
causes of disease for each individual.

[The functional medicine model >](#)

