

# Be a Pre- & Probiotic Pro: Overview of the Gut Microbiome



**bell institute**  
OF HEALTH, NUTRITION & FOOD SAFETY  
General Mills

# Welcome!



**Ravi Menon, PhD**

*Senior Principal Scientist*  
**General Mills**



# Overview of Today's Presentation

## I. The Consumer Perspective

## II. Dietary strategies to support gut microbiota

- Probiotics *vs.* Prebiotics *vs.* Fermented Foods

## III. Make smart choices when choosing or recommending probiotics

- Health considerations
- The scientific evidence



# Today's presenters



**Suzanne Skypyak, MS, RD**  
*Principal Scientist*  
**General Mills**



**Mary Ellen Sanders, PhD**  
*Consultant*  
**Dairy & Food Culture Technologies**  
**Executive Science Officer**  
**International Scientific Association for**  
**Probiotics and Prebiotics**

*Slides will be available after the webinar*

# Why the Gut Microbiome, Pre- & Probiotics?

fermented flora  
dietary probiotic  
digestive gut supplement  
microbiome kefir  
yogurt bugs prebiotic  
bacteria health





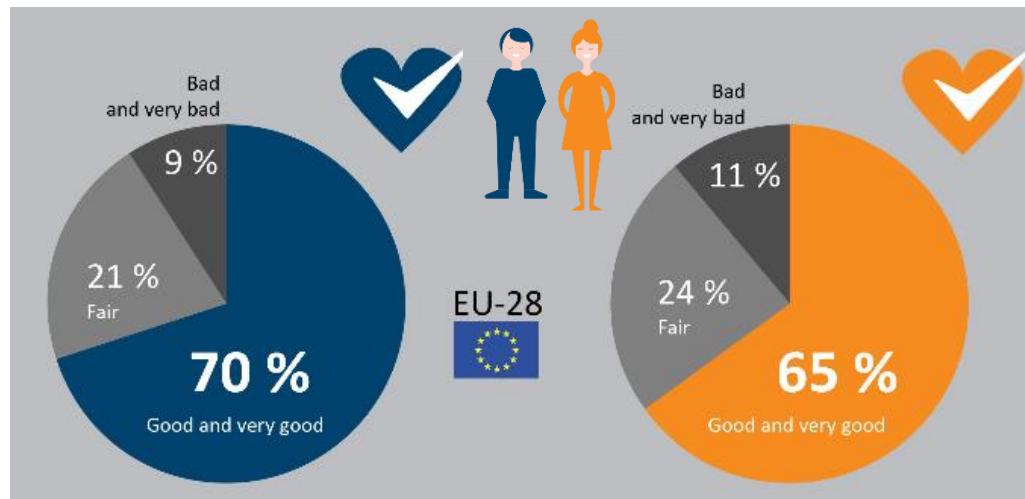
# *The Relationship Between Consumers & Their Guts*

**Suzanne Skapyak, MS, RD**  
*Principal Scientist*  
**General Mills**

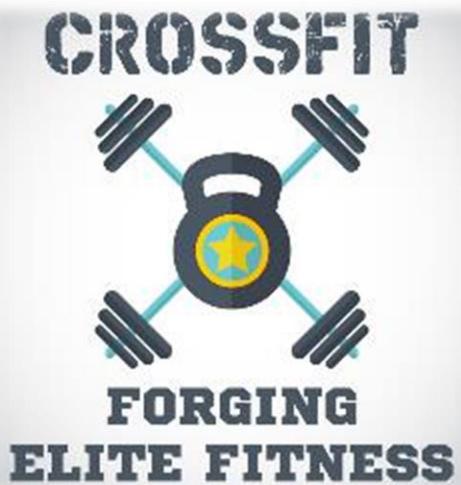
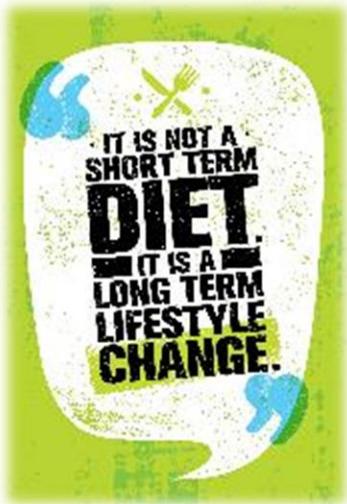
# Consumers feel that they are not at optimal health...

There is a significant amount of people that do not feel optimal:

- **Nearly 20% of Americans say they're in fair or poor health.**  
~Data from Centers for Disease Control
- **Nearly 30% of European men and 35% of European women say they're in fair or poor health.**  
~Data and image below from Eurostat, Health in the European Union



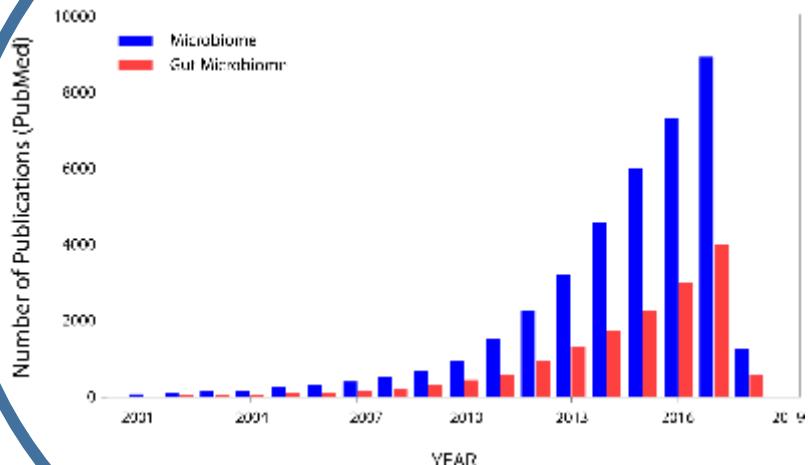
...and they are tired of it



# Both Science and Influencers: converging on The Power of the Gut



## SCIENCE



## FOOD INFLUENCERS



"Microbes are hot a topic right now and that will only continue as we learn how many more health conditions are influenced by bacteria"  
~John Durant,  
*The Paleo Manifesto*



"Some of My Best Friends Are Germs"  
~Michael Pollan,  
*In Defense of Food*

GUT

# Our Research's Goal

**Gain a comprehensive understanding of how consumers think about how their gut affects their health... today and in the future**



# Why the gut microbiome resonates with consumers



The gut microbiome matches the world in which we now live—one of interconnected systems



# Why the gut microbiome resonates with consumers



**It also resonates because it promises consumers a way to take back control over their own health and wellness**



# Why the gut microbiome resonates with consumers



The ambiguous reach of “the gut” matches the ambiguous nature of the illnesses

Do I suffer from inflammation?

Why do I feel moody?

Why am I digesting badly?

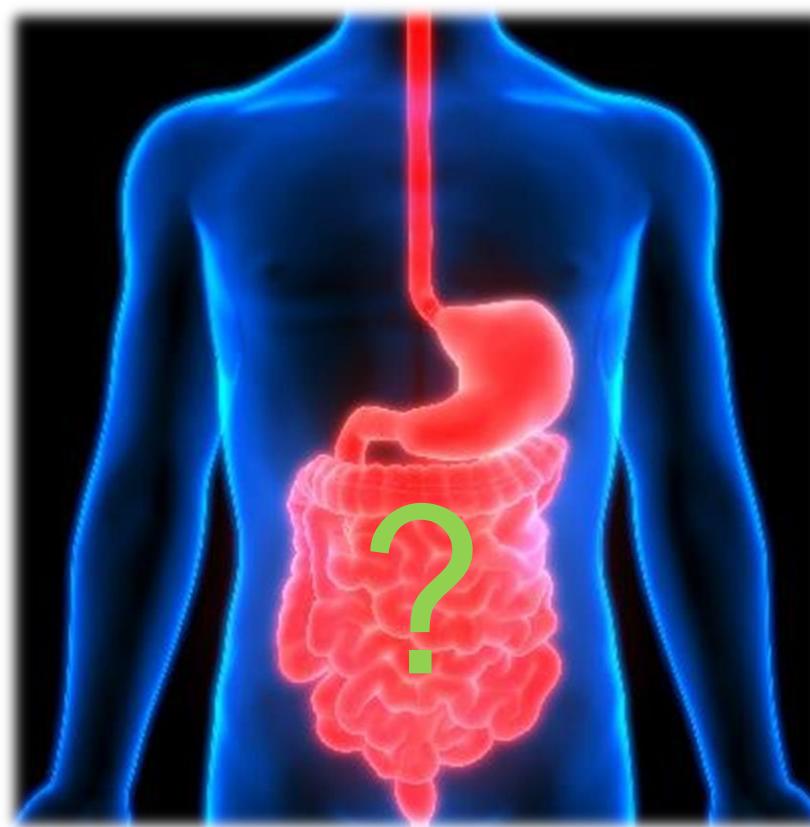
Why am I tired?

Am I sensitive to gluten?

Why can't I get rid of my migraines?

Why am I overweight?

Why am I not regular?



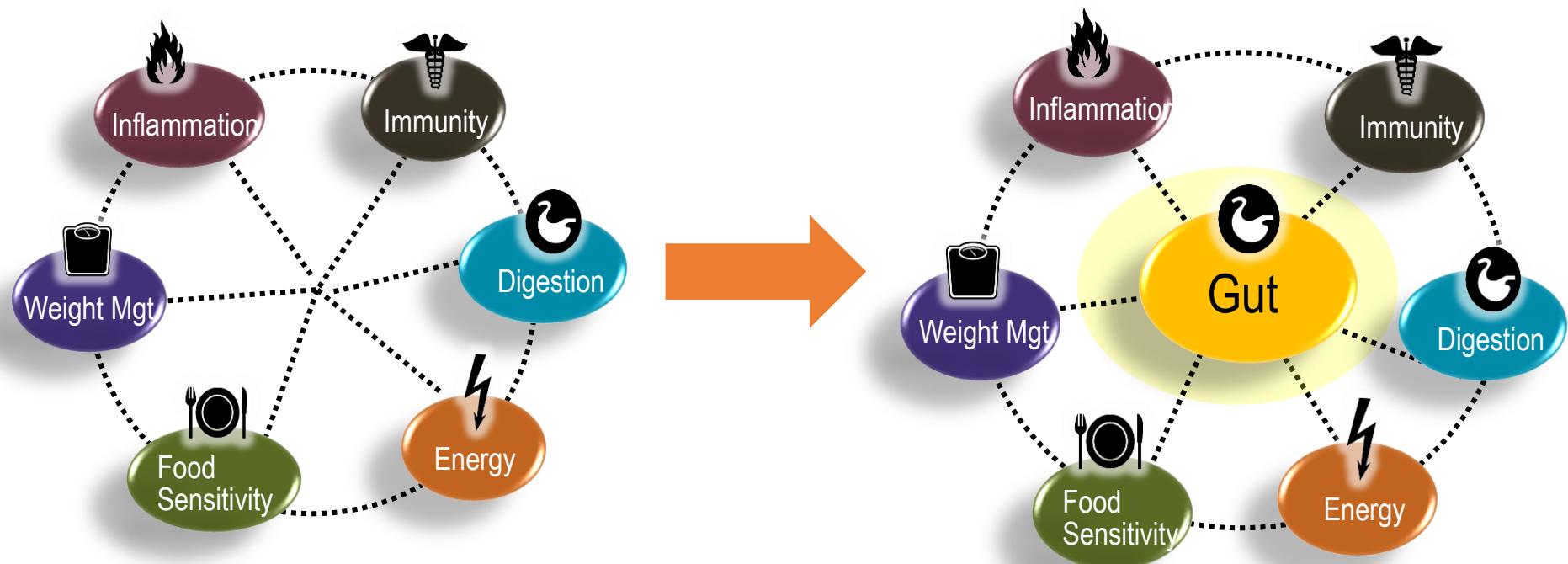
# Why the gut microbiome resonates with consumers



This group is tired of just treating the symptoms. They want to get at the root cause



# Health is evolving away from a disconnected model to one connected through the gut



**Consumer Established  
View of Health  
Disconnected model**

**Evolving View of  
Health  
Interconnected Model**

# Health through the Gut... a journey

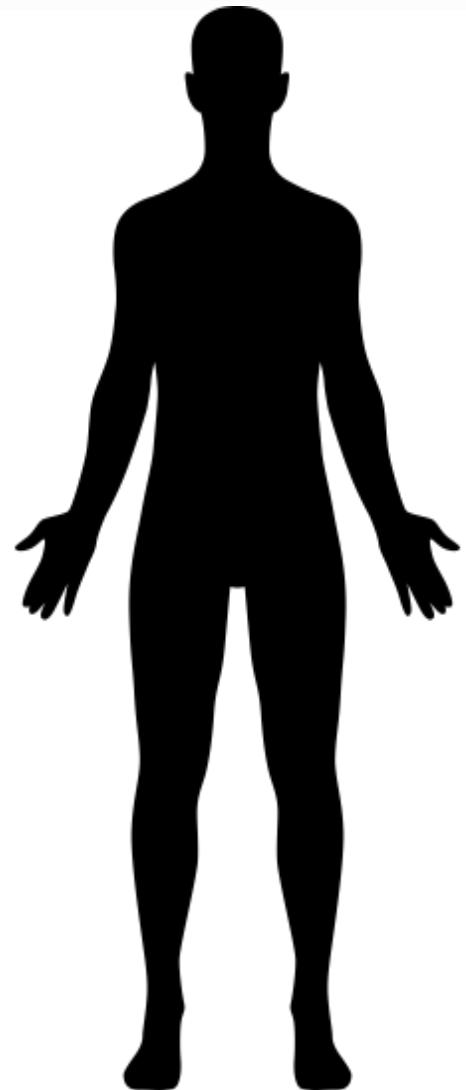


# Health through the Gut... a journey



So how do people solve  
for these needs?

It depends on how they  
think their body works.



# Some envision their body as a Simple Machine



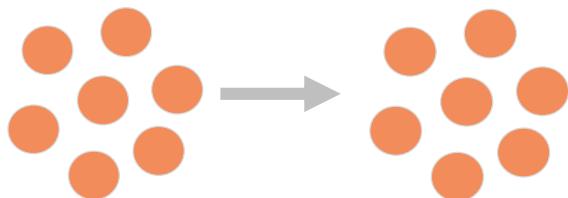
- **Nutrient Approach:** Consume certain amounts of specific nutrients
- **Universal Rules:** Follow a structured set of dietary guidelines
- **One to One Effect:** Eat foods for specific impact on my body



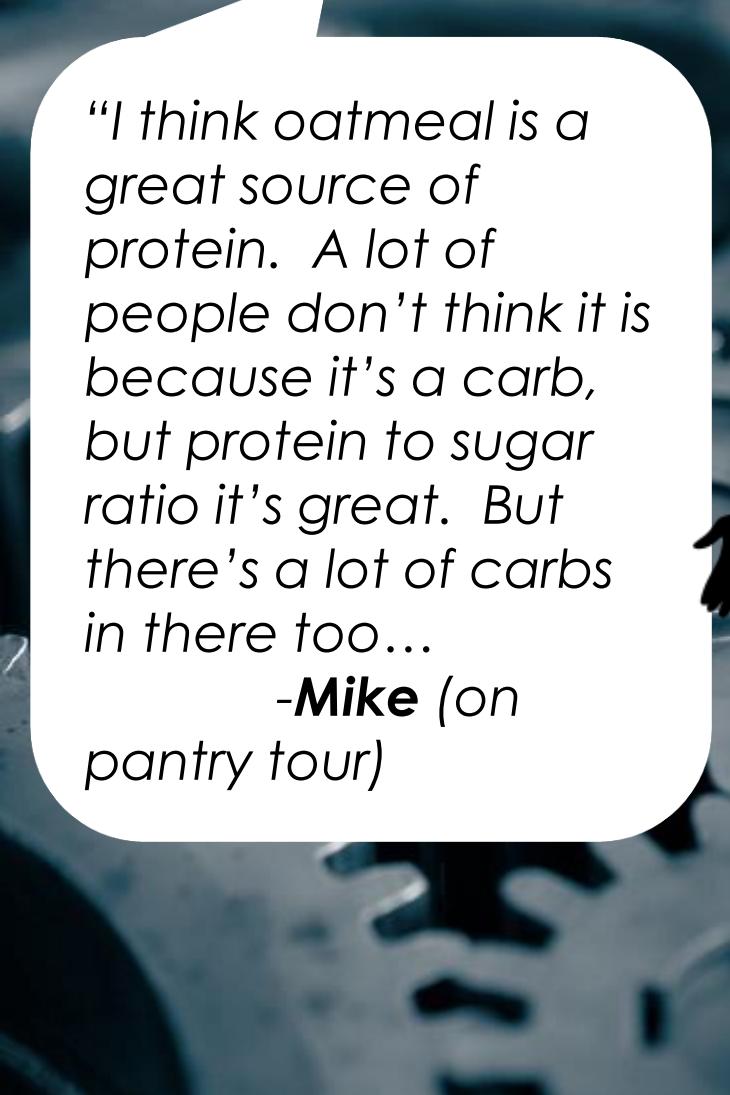
# Others see their body as a unique complex ecosystem



- **Holistic Approach:** Eat whole, real foods. We don't know what we're missing.
- **Adaptable:** Eat well overall, but work within my nature.
- **Many-to-Many Effect:** Everything interacts with each other, so go for diversity.

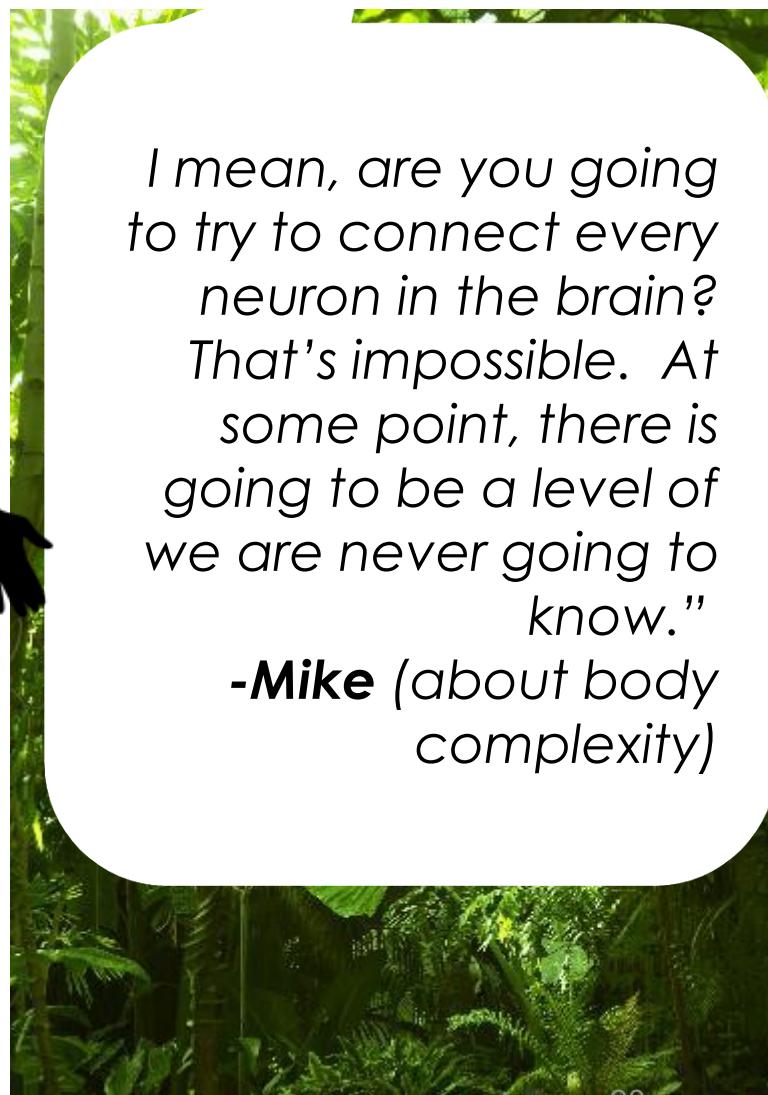
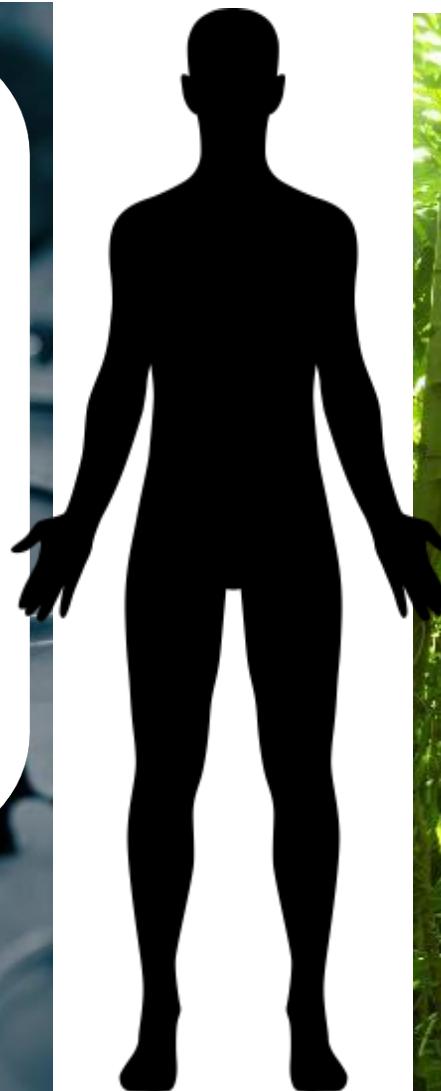


# Most of all, the body can be seen as both Simple Machine and Complex System



"I think oatmeal is a great source of protein. A lot of people don't think it is because it's a carb, but protein to sugar ratio it's great. But there's a lot of carbs in there too..."

-**Mike** (on pantry tour)



I mean, are you going to try to connect every neuron in the brain? That's impossible. At some point, there is going to be a level of we are never going to know."

-**Mike** (about body complexity)

# Each lens has a different set of rules for what people seek for gut health solutions



My body is a  
**SIMPLE  
MACHINE**



**Nutrient  
Approach**

**Universal  
Rules**

**One-to-one  
Effects**



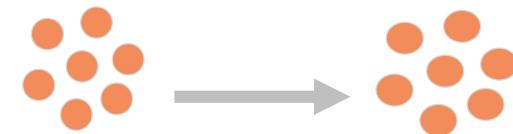
My body is a  
**COMPLEX  
ECOSYSTEM**



**Holistic  
Diet  
Approach**

**Adaptable  
Best  
Practices**

**Many-to-Many  
Effects**



# Solutions to take control of my health through my gut



My body is a  
**SIMPLE  
MACHINE**



## Nutrient Approach

- Numbers,
- %, content
- Health claims

## Universal Rules

- Functional
- Man made
- Extracted

## One-to-one Effects

- Give me targeted outcomes!



My body is a  
**COMPLEX  
ECOSYSTEM**



## Holistic Diet Approach

- No numbers
- Inherent benefit

## Adaptable Best Practices

- Holistic
- Intact
- Real food

## Many-to-Many Effects

- Give me nurtured balance!



# How to Help Your Patients and Residents



## 1. How are they talking about their health?

- As a "Simple Machine" or as a "Complex Ecosystem"?
- What are they looking for ? Curing/maintaining ?

## 2. What is their level of awareness regarding the gut microbiome?

- Providing education is highly needed today to avoid "magic remedies"
- Helping them to consider the gut as a crucial part of their everyday health they need to take care of

## 3. Then adapt your recommendation/help to their vision of health

- Depending if they want to cure or maintain their health, adapt your solutions to their vision, for higher success



# Be a Pre- & Probiotic Pro: **The Science**

**Mary Ellen Sanders**  
*Consultant*  
**Dairy & Food Culture Technologies**  
**Executive Science Officer,**  
**International Scientific Association for Probiotics and**  
**Prebiotics**

*Slides will be available after the webinar*

# Microbes associated with the human body are important to health



## Our colonizing microbes impact:



- Food digestion
- Immune system development
- Endocrine function
- Energy homeostasis
- Fat storage
- Blood lipids
- Brain signaling
- Gut integrity and function

# Dietary strategies to support gut microbiota



# Dietary strategies to support gut microbiota



## Fibers

- Increase overall microbial numbers and diversity



# Dietary strategies to support gut microbiota



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## Fermented Foods

- Examples include yogurt, cheese, kefir, pickles, kim chi, kombucha.



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## Prebiotics

- Selectively increase beneficial bacteria populations or activities

# Dietary strategies to support gut microbiota



## Fibers

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## Prebiotics

- Selectively increase beneficial bacteria populations or activities

## Probiotics

- Live microbes, shown to have a health benefit
- Single strains or blends of several strains
- Defined and characterized

# What ARE Prebiotics?



**Substrates that are selectively utilized by host microorganisms, confer a health benefit**

- Prebiotics include:
  - FOS (fructo-oligosaccharides)
  - GOS (galacto-oligosaccharides)
  - Inulin
- Others are emerging

NATURE REVIEWS | GASTROENTEROLOGY & HEPATOLOGY

**CONSENSUS STATEMENT**

**OPEN**

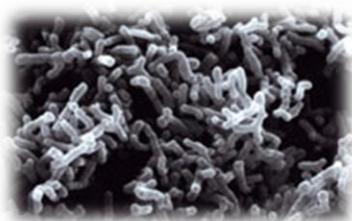
**EXPERT CONSENSUS DOCUMENT**

The International Scientific Association for Probiotics and Prebiotics (ISAPP) consensus statement on the definition and scope of prebiotics

Glenn R. Gibson<sup>1</sup>, Robert Holt<sup>2</sup>, Mary Ellen Sanders<sup>3</sup>, Susan L. Prescott<sup>4</sup>, Raylene A. Reimer<sup>5</sup>, Seppo J. Salminen<sup>6</sup>, Karen Scott<sup>7</sup>, Catherine Stanton<sup>8</sup>, Kelly S. Swanson<sup>9</sup>, Patrice D. Cani<sup>10</sup>, Kristin Verbeke<sup>11</sup> and Gregor Reid<sup>12</sup>

Some prebiotics are found in onions, garlic, bananas, chicory root, Jerusalem artichokes, but typically are present at low levels.

# What ARE Probiotics?



***Live microorganisms* that, when administered in adequate amounts, confer a health benefit on the host**

## FAO/WHO Expert Consultation

Widely accepted definition developed

## Definition Established?

>40,000 downloads of Hill et al.

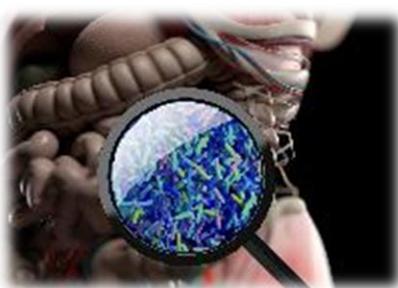
2001

2014

2018

**2001 Definition Affirmed**  
Hill et al. Nature Rev  
Gastroenterol Hepatol

# Probiotics vs. Prebiotics



## Probiotic

- Microorganism
- Alive
- Beneficial health effect
- May act via microbiota, but other mechanisms

## Prebiotic

- Typically a non-digestible carbohydrate
- Not Alive
- Beneficial health effect
- Act via microbiota

# Prebiotic and Probiotic Infographics from ISAPP

## Prebiotics

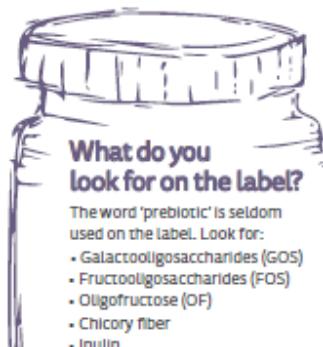
### What are prebiotics?

Substrates that are selectively utilized by host microorganisms conferring a health benefit. Simply put, they are food for beneficial microbes that live on or in us



### Prebiotic facts

- Prebiotics provide health benefits by specifically altering either the composition or function of the gut microbiota.\*
- Prebiotics can be found naturally in foods, and are added to some dietary supplements and foods, including foods for infants.
- Most prebiotics are dietary fibers, but not all dietary fibers are prebiotics.
- As with dietary fibers, some gas or bloating can result from too much prebiotic. Start with small amounts and allow your gut to adapt.
- \* The human digestive tract contains 100 trillion bacterial cells. These bacteria, termed our intestinal microbiota, are important to our health.



### What do you look for on the label?

The word 'prebiotic' is seldom used on the label. Look for:

- Galactooligosaccharides (GOS)
- Fructooligosaccharides (FOS)
- Oligofructose (OF)
- Chicory fiber
- Inulin



International Scientific Association for Probiotics and Prebiotics

### Prebiotics for your health

Prebiotics have the potential to:

- Improve digestive function (bowel regularity)
- Support the body's natural defenses
- Improve mineral absorption
- Help regulate your desire to eat, energy balance, and glucose metabolism

### Prebiotics in food

Some prebiotics (oligofructose and inulin) can be found in onions, garlic, bananas, chicory root, Jerusalem artichokes, but typically are present at low levels. To increase your daily intake, include prebiotic supplements or foods with added prebiotics as part of your diet.

Prebiotics may be added to yogurts, infant formula, cereals, breads, biscuits/cookies, desserts or drinks.

Try to get at least 5 grams of prebiotics in your diet every day. Eating whole grains, fruits and vegetables, and other fiber-rich foods can help.

### Prebiotics in mother's milk

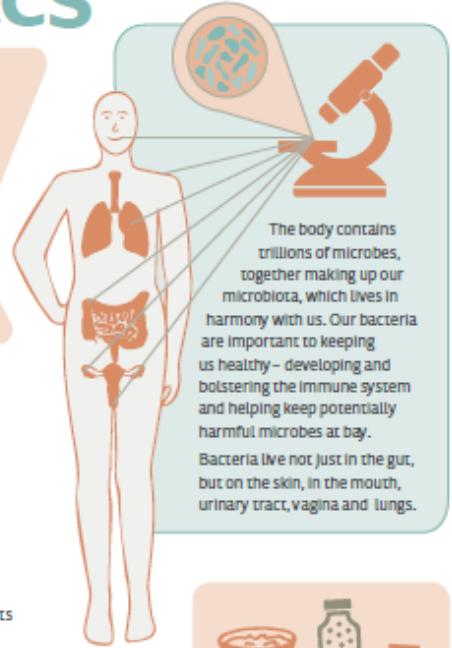
Human milk provides a rich source of prebiotics to the nursing baby. They support infant's health by encouraging beneficial gut microbes.

For more information visit [ISAPPscience.org/prebiotics](https://isappscience.org/prebiotics) or follow us on Twitter @ISAPPscience

## Probiotics

### What are probiotics?

Probiotics are live microorganisms that when taken in sufficient amounts can provide health benefits. They can help support the bacteria that live with us, especially when our bacteria are challenged, for example by antibiotics, poor diet or traveling. Scientists define probiotics as live microorganisms that, when administered in adequate amounts, confer a health benefit on the host. They are present in numerous foods and dietary supplements.



### What can probiotics do for you?

Probiotics can support health in different ways

- Help your immune system function properly
- Aid digestion by breaking down some of the food we can't digest
- Keep harmful microorganisms in check
- Produce vitamins and aid in nutrient absorption

Some probiotics may:

- Help reduce antibiotic-associated diarrhea
- Help manage digestive discomforts
- Help reduce colic symptoms and eczema in infants
- Help with the digestion of lactose
- Treat infectious diarrhea
- Decrease common infections, including respiratory tract, gut and vaginal tract



### Sources of probiotics

Yogurt - Look for added probiotics listed on the label.

Supplements - These can be convenient for travel and may have a higher potency than foods.

Fermented Foods - Can be sources of live bacteria. If not heat-treated. See: [isappscience.org/fermented-foods](https://isappscience.org/fermented-foods)



International Scientific Association for Probiotics and Prebiotics

For more information visit [www.ISAPPscience.org](https://isappscience.org) or follow us on Twitter @ISAPPscience

### Choosing a probiotic

Match the strain to the benefit you want – not all strains are the same.

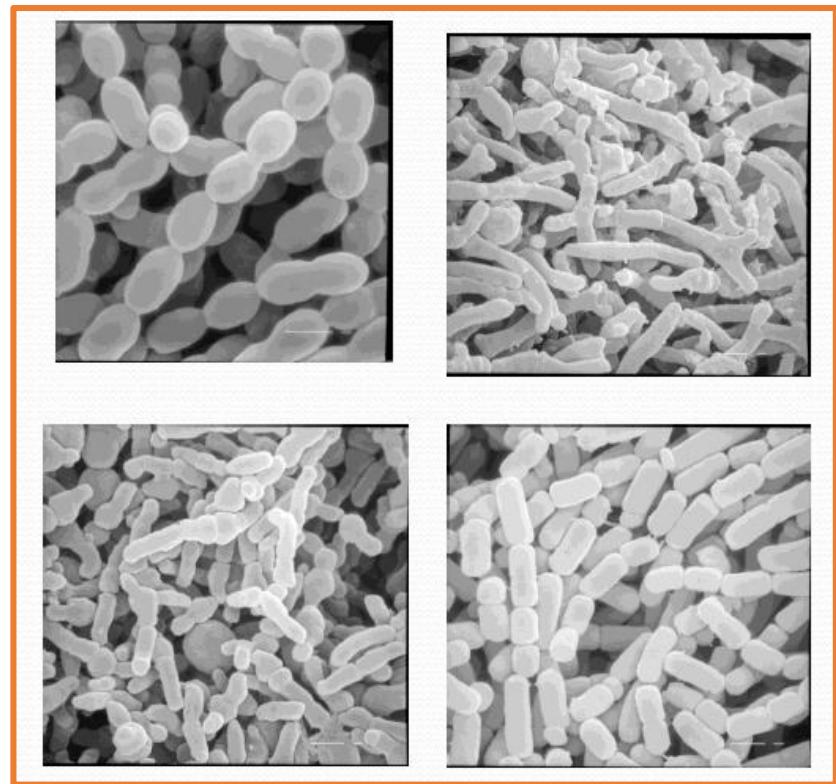
Amounts matter. Be sure the product contains the level of probiotics needed for the health benefit.

Safety first. Probiotics are safe for most people, but talk to your doctor first if you suffer from an immune disorder, have a serious underlying illness or before giving to an infant.

# Common microbes used as Probiotics



- *Lactobacillus*
- *Bifidobacterium*
- *Saccharomyces*
- *Bacillus*



As we learn more about normal, colonizing bacteria, this range of probiotic microbes likely to expand

# Probiotics vs. Fermented Foods



## Probiotic

- Must contain live microbes
- Must be tested and shown to have health benefits

**Yogurt:** both fermented food **AND** probiotic food

- Probiotic yogurt: added probiotics beyond starters
- Regular yogurt: helps reduce symptoms of lactose intolerance

## Fermented Foods

- Made by live microbes, but live microbes may not survive (post-fermentation processing)
- May not have been tested for health benefits
- Likely healthy dietary components, but may not be probiotics

- Fermented foods** may be a source of live microbes, but they MIGHT not be **probiotic**

# Not all Probiotics are the same: strains matter



*Equus caballus*  
**Same species, different function**

# Not all Probiotics are the same



*Equus caballus*

Same species, different function

For Probiotics: Even 2 strains of the same genus/species may function differently

*Lactobacillus acidophilus NCFM*

*Lactobacillus acidophilus LA 1*

genus

species

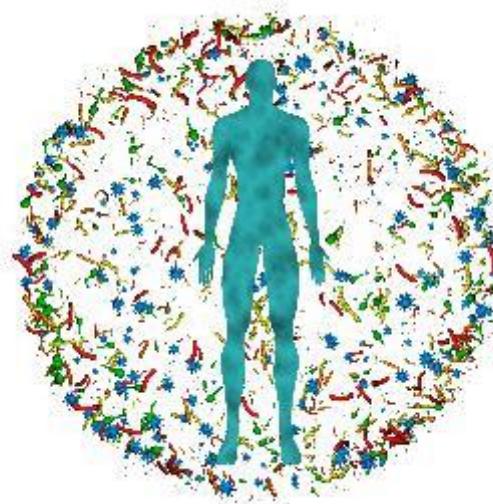
strain

# Choosing a probiotic



**Decision should be based on...**

- ✓ Evidence that a specific probiotic has a specific benefit
- ✓ An individual's health and specific health concerns



# Let evidence be your guide...



## Many strains are not necessarily better

- Choose a strain or strain blend tested in human studies and shown to be effective



## High doses are not necessarily better

- 1 Billion vs 50 Billion?
- Choose a dose that matches the level tested in human studies



# Let evidence be your guide...



## Foods vs. Supplements?

- Look for a product that has been studied:  
some foods, some supplements



*L. rhamnosus* GG



*L. rhamnosus* GR-1  
*L. reuteri* RC-14



*S. thermophilus*, *Lactobacillus*  
and *Bifidobacterium* strains



*B. infantis* 35264



*L. reuteri* DSM 17938



*Saccharomyces boulardii*  
Lyo CNCM I-745



*L. plantarum* 299V



*B. lactis* Bb12



*B. lactis* HN019

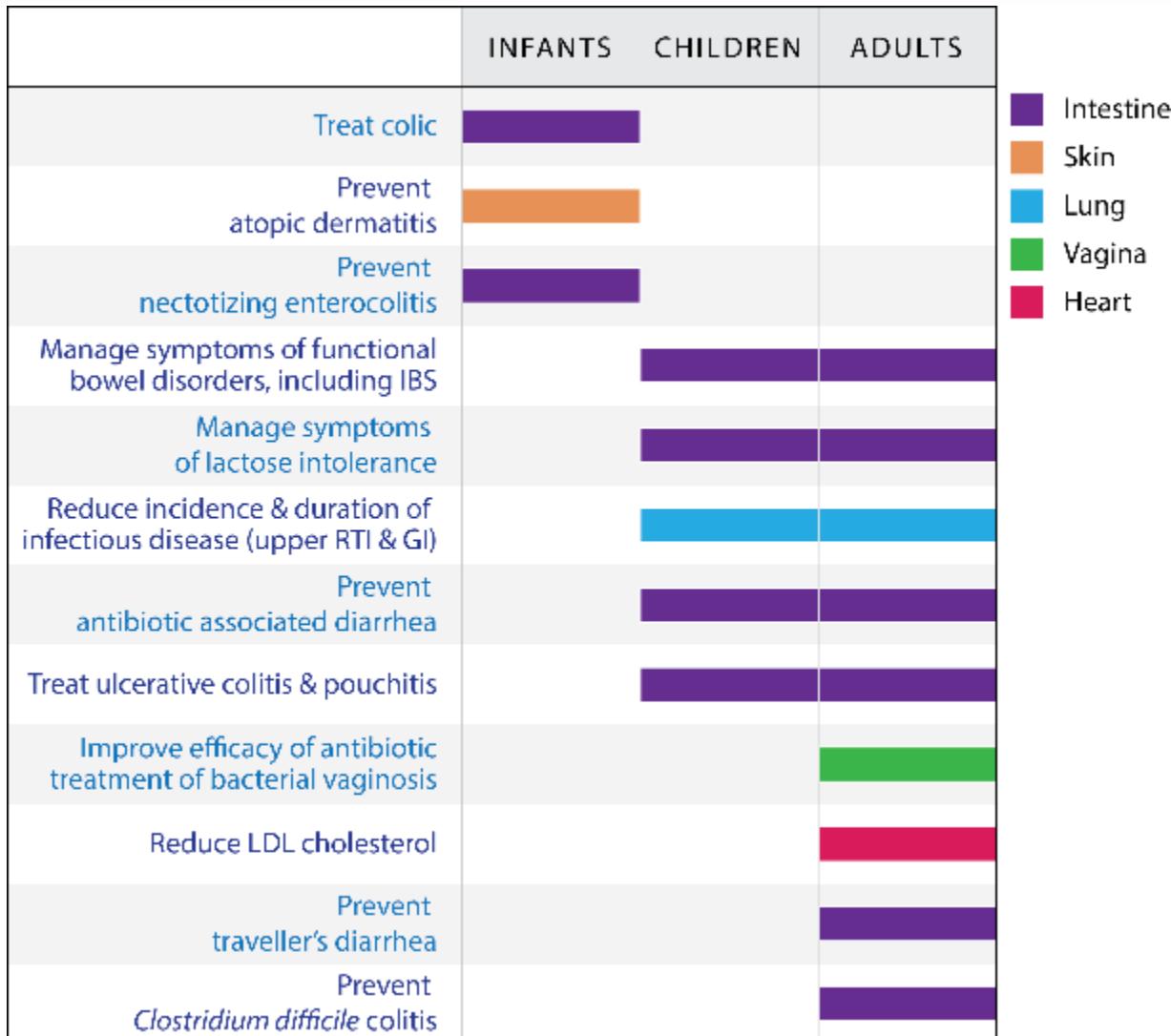


*B. lactis* Bb12

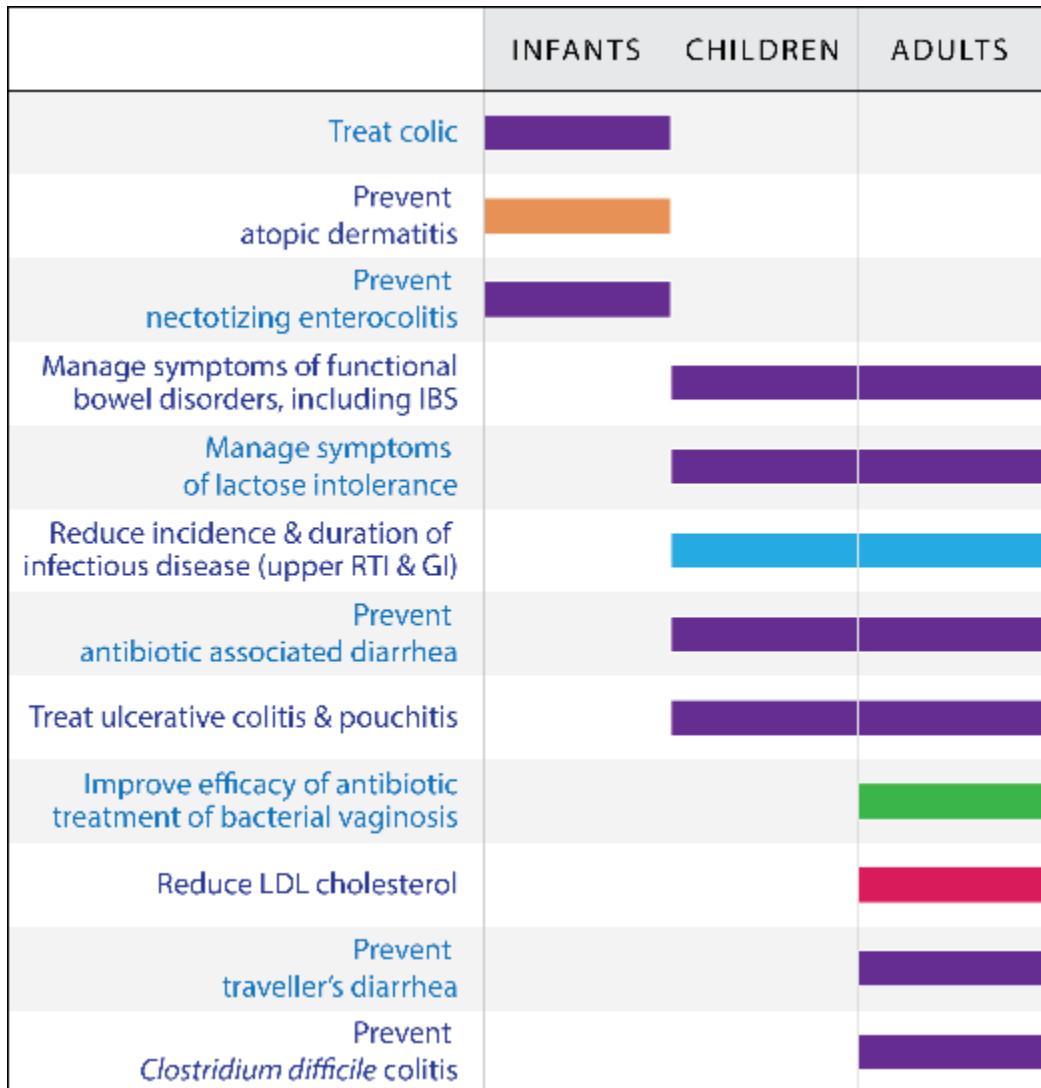


*B. lactis* Bb12

# Evidence for benefits of probiotics in humans



# Evidence for benefits of probiotics in humans



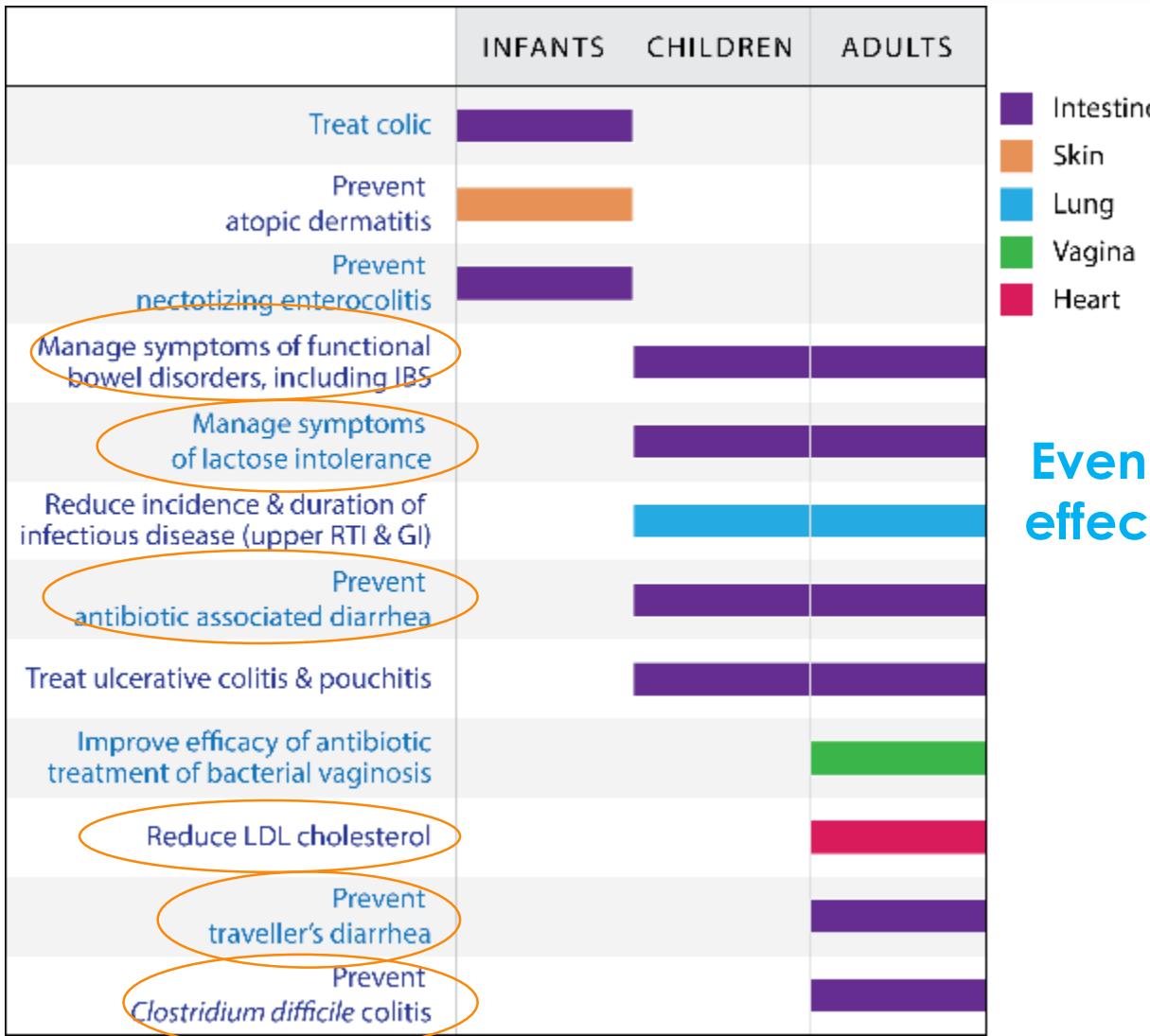
- Intestine
- Skin
- Lung
- Vagina
- Heart

Clinical Guide to Probiotic Products

Available in the US: 2017 Edition

Indications, Dosage Forms and Clinical Evidence to Date

# Probiotics may provide a safe approach to dietary management of many modern health challenges



Even small magnitudes of effect may be meaningful for health!

Remember: not everyone will react to a probiotic in the same way



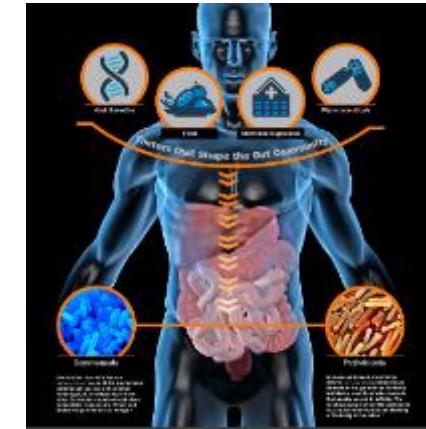
Diet



Colonizing microbiota



Individual characteristics of each person



# Should “microbiota-directed foods” be including in national dietary guidelines?



## Scientific Report of the 2015 Dietary Guidelines Advisory Committee

Advisory Report to the Secretary of Health and Human Services  
and the Secretary of Agriculture

No mention of probiotics or prebiotics

“...the Committee considers the microbiome to be an emerging topic of potential importance to future DGACs.”

**In the United States:**  
The dietary guidelines committees have recognized the importance of dietary support of microbiota, but have not yet embraced it

# Resources to consult for more information



## World Gastroenterology Organisation

- WGO Global Guidelines: Probiotics & Prebiotics
- Tables 8 (adult) and 9 (pediatric)



World Gastroenterology Organisation  
Global Guardian of Digestive Health. Serving the World.

## Clinical Guide to Probiotic Products

- Industry funded, but independently conducted
- Updated annually

### Clinical Guide to Probiotic Products

Available in the US: 2017 Edition

Indications, Dosage Forms and Clinical Evidence to Date

## International Scientific Association for Probiotics and Prebiotics

- Infographics
- Videos



HOW TO CHOOSE A PROBIOTIC



# Closing Key Points



- ✓ Our colonizing microbiota are important to our health
- ✓ Dietary strategies to help support our gut microbiota include:
  - Fiber, prebiotics, probiotics, fermented foods
- ✓ Fermented foods may contain live microbes but might not have been studied for health benefits
  - Not all fermented foods are probiotic foods



- ✓ Health benefits for probiotics include therapeutic benefits and benefits for generally healthy people
- ✓ When choosing a probiotic, let evidence of health benefit be your guide
  - Some evidence-based guidelines available
- ✓ Individuals may respond differently to probiotics



# Recipes and Resources



Visit the General Mills Foodservice website:

[generalmillscf.com](http://generalmillscf.com)

for recipes with yogurt,

and many more tools and resources.



Berry Banana Smoothie Bowl



Banana Nut Smoothie Bowl



Tropical Green Smoothie Bowl



Gluten-Free Swiss Yogurt Oatmeal

# Thank you! Questions & Answers

#BeAProbioticPro



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Foodservice

# Poll Question to Participants



**Which of the following is most representative of your current consumption, or your recommendations to patients or residents for gut health?**

- **Supplements**
- **Probiotics**
- **Prebiotics**
- **Fermented Foods**
- **All of the above**
- **None of the above**
- **Depends on the situation**