

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

Slides will be available after the webinar

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 Skapyak, 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
digestive
supplement
microbiome
yogurt
prebiotic
bacteria
health
probiotic
gut
kefir
bugs





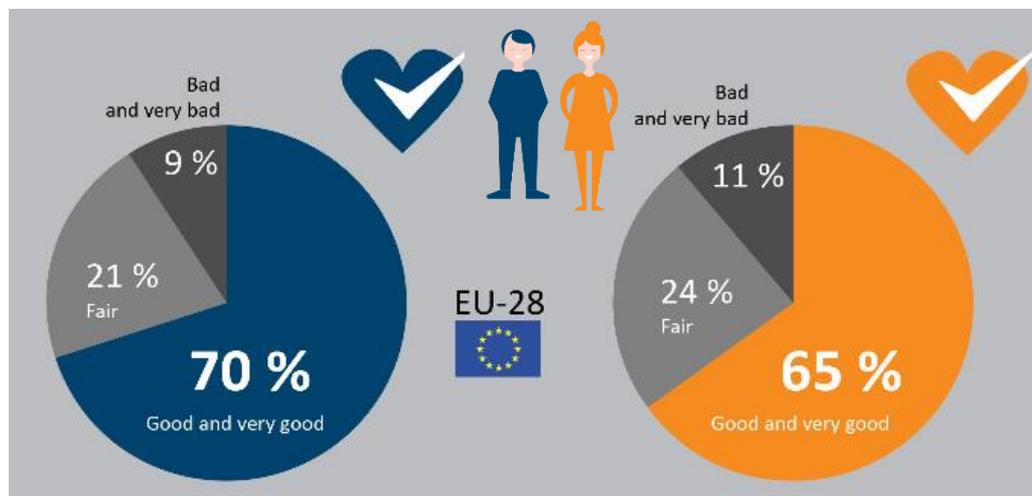
The Relationship Between Consumers & Their Guts

Suzanne Skapyak, MS, RD
Principal Scientist
General Mills

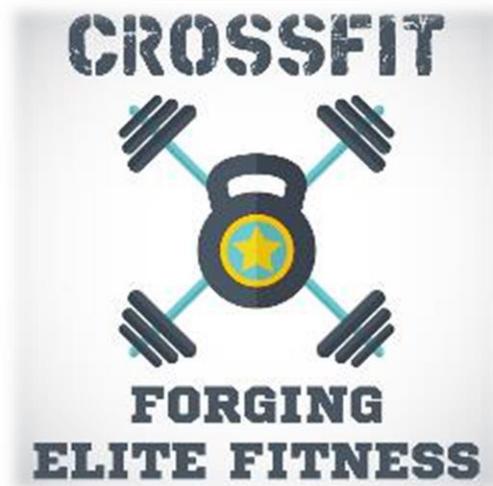
Consumers feel that they are not at optimal health...

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

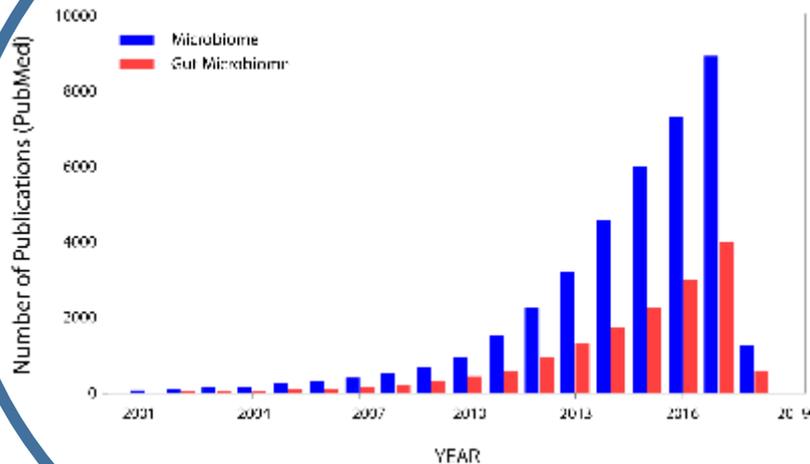


Both Science and Influencers: converging on The Power of the Gut



SCIENCE

FOOD INFLUENCERS



GUT



“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

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**?

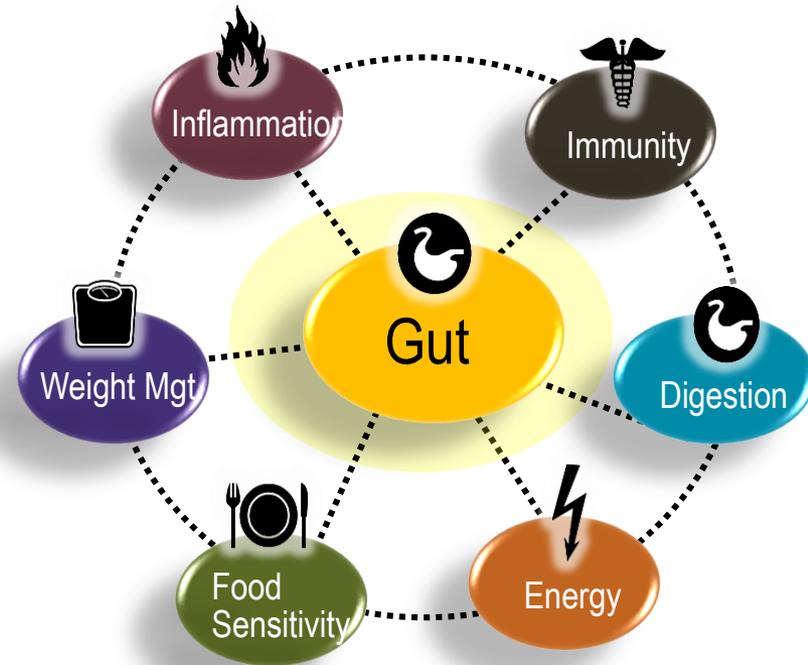
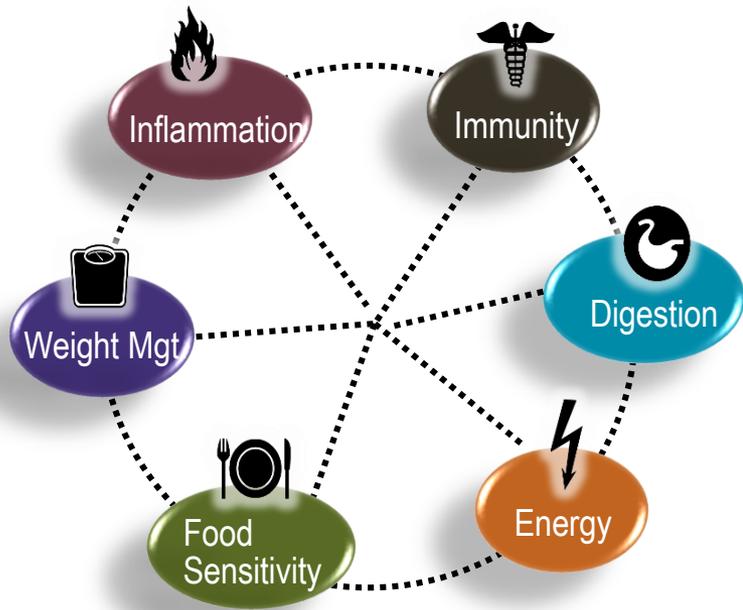
Why the gut microbiome resonates with consumers



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



Adoption

Tomorrow
Mass market

"Prebiotics" ?
'Microbiome' ?



Today

Early adopters

'Good bacteria - flora'
"Probiotics"

Advanced market



HOLISTIC
SELECT

Head to tail health starts in the middle.™



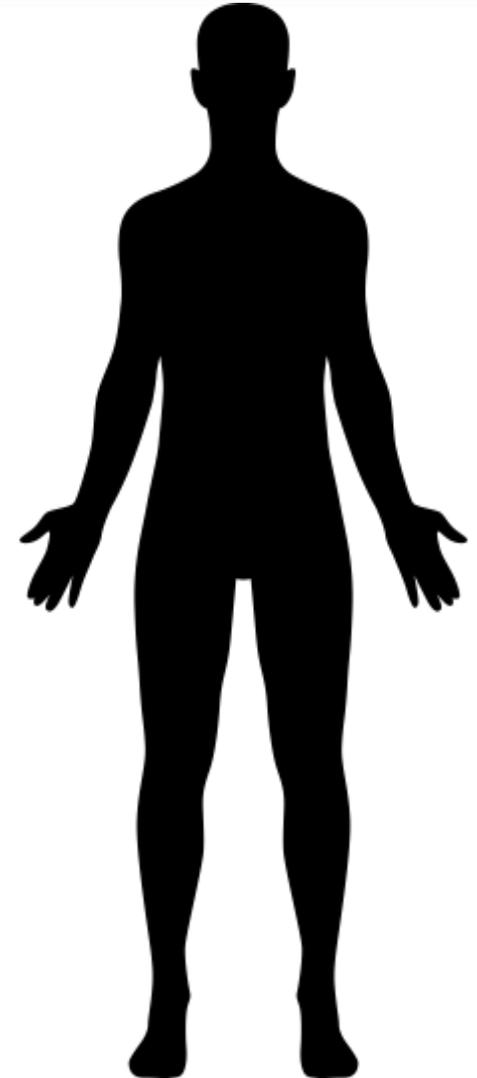
Time

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

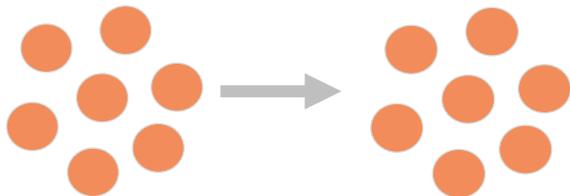


- Nutrient Approach: Consume certain amounts of specific nutrients
- Universal Rules: Follow a structured set of dietary guidelines
- One to One Effect: Eat foods for specific impact on my body



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

Fibers

- Increase overall microbial numbers and diversity

Fermented Foods

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



Dietary strategies to support gut microbiota

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Prebiotics

- Selectively increase beneficial bacteria populations or activities

Dietary strategies to support gut microbiota

Fibers

- Increase overall microbial numbers and diversity

Fermented Foods

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



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. Gibson¹, Robert Hutkins², Mary Ellen Sanders³, Susan L. Prescott⁴, Raylene A. Reimer⁵, Seppo J. Salminen⁶, Karen Scott⁷, Catherine Stanton⁸, Kelly S. Swanson⁹, Patrice D. Cani¹⁰, Kristin Verbeke¹¹ and Gregor Reid¹²

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

2001

2014

2018

Definition Established?

>40,000 downloads of Hill et al.

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

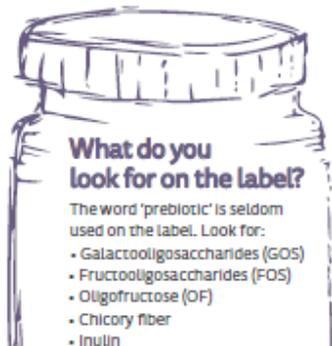
What are prebiotics?

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.



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

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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

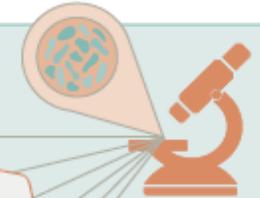
Sources of probiotics

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



International Scientific Association for Probiotics and Prebiotics

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



The body contains trillions of microbes, together making up our microbiota, which lives in harmony with us. Our bacteria are important to keeping us healthy – developing and bolstering the immune system and helping keep potentially harmful microbes at bay. Bacteria live not just in the gut, but on the skin, in the mouth, urinary tract, vagina and lungs.



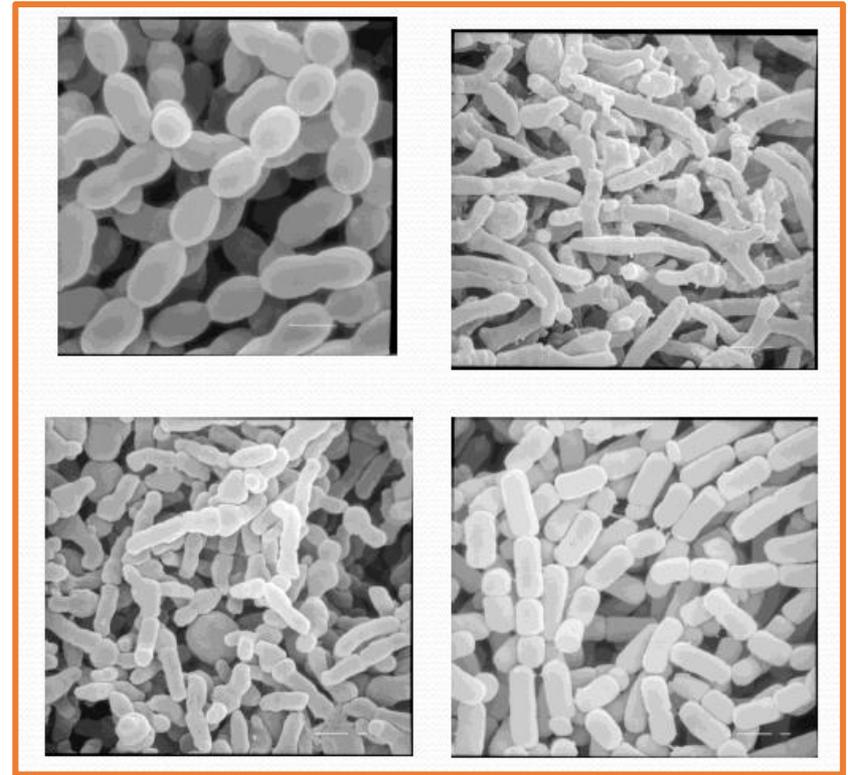
Choosing a probiotic

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.

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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 LA1

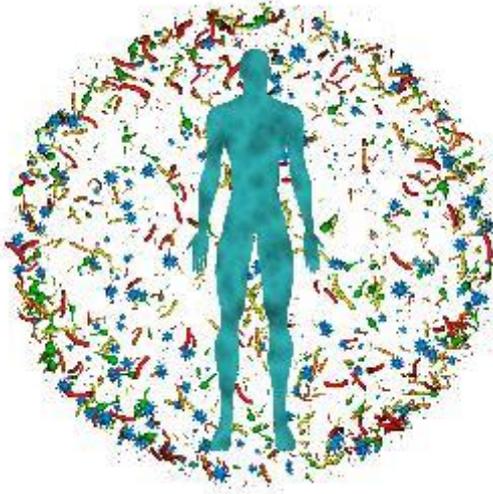
genus species strain

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



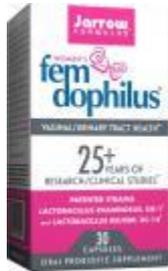
Let evidence be your guide...

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. lactis Bb12



B. lactis HN019



B. infantis 35264



L. reuteri DSM 17938



Saccharomyces boulardii
Lyo CNCM I-745



L. plantarum 299V

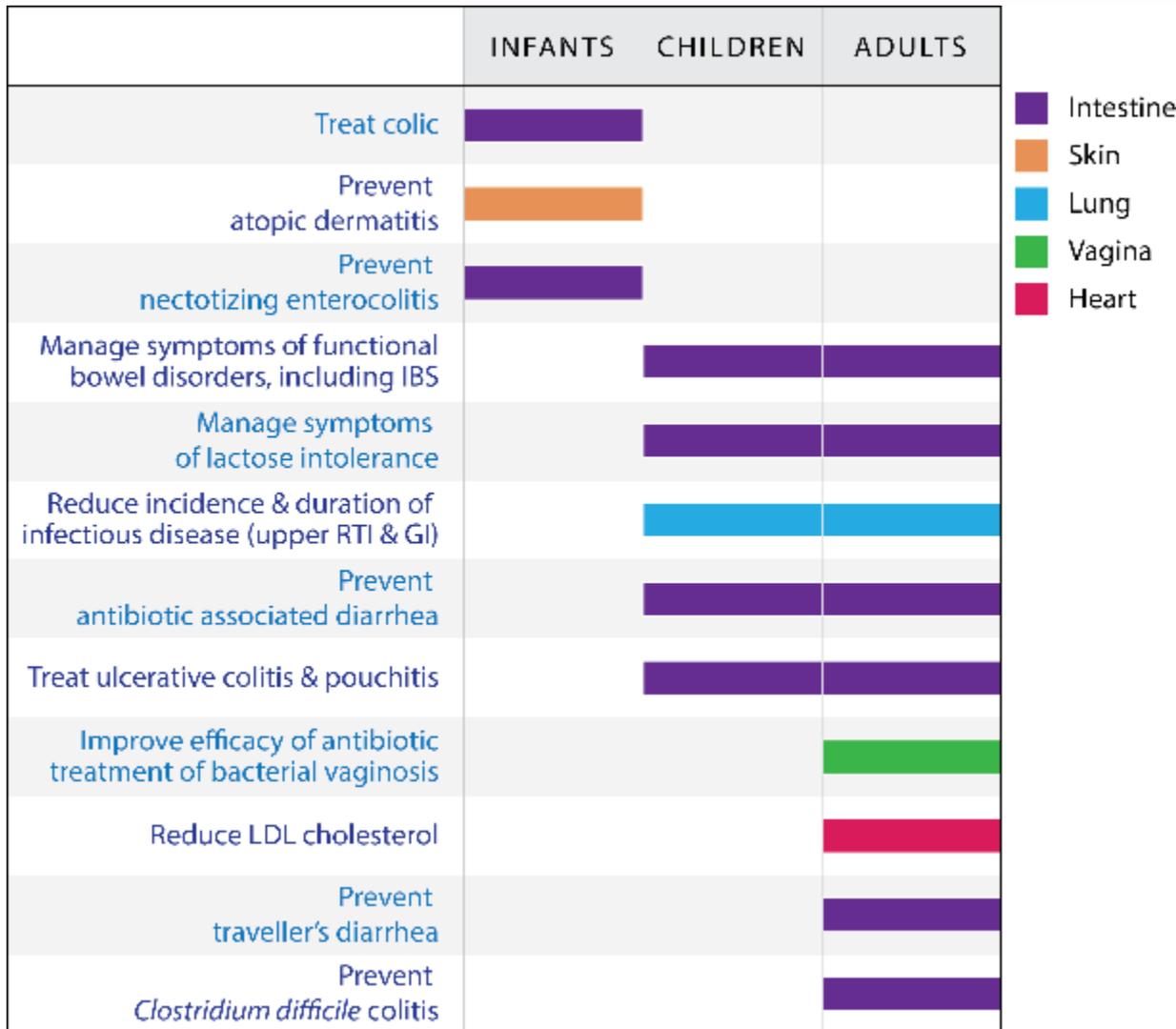


B. lactis Bb12

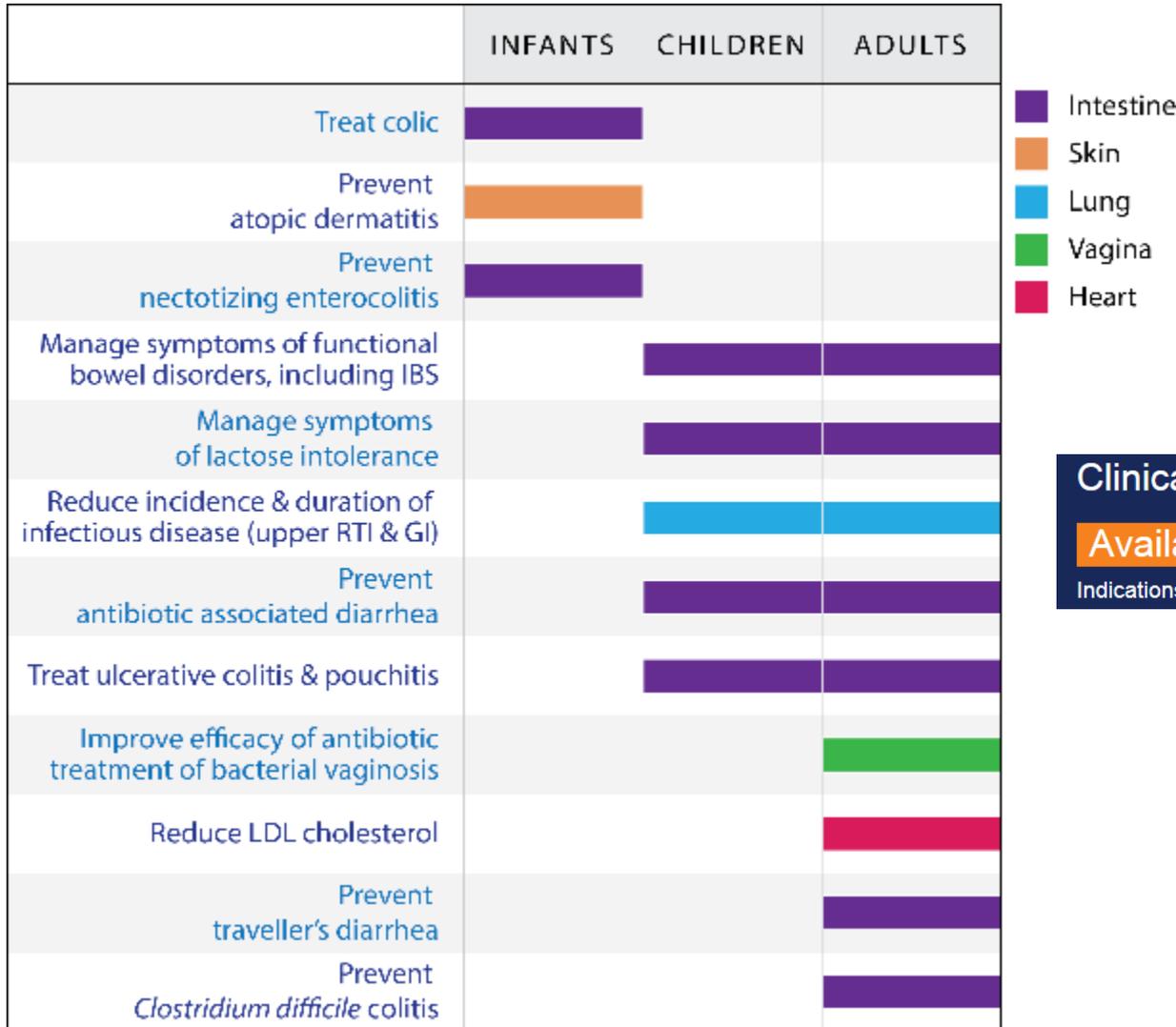


B. lactis Bb12

Evidence for benefits of probiotics in humans



Evidence for benefits of probiotics in humans



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

	INFANTS	CHILDREN	ADULTS
Treat colic	Intestine		
Prevent atopic dermatitis	Skin		
Prevent necrotizing enterocolitis	Intestine		
Manage symptoms of functional bowel disorders, including IBS		Intestine	Intestine
Manage symptoms of lactose intolerance		Intestine	Intestine
Reduce incidence & duration of infectious disease (upper RTI & GI)		Lung	Lung
Prevent antibiotic associated diarrhea		Intestine	Intestine
Treat ulcerative colitis & pouchitis		Intestine	Intestine
Improve efficacy of antibiotic treatment of bacterial vaginosis			Vagina
Reduce LDL cholesterol			Heart
Prevent traveller's diarrhea			Intestine
Prevent <i>Clostridium difficile</i> colitis			Intestine

- Intestine
- Skin
- Lung
- Vagina
- Heart

Even small magnitudes of effect may be meaningful for health!

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



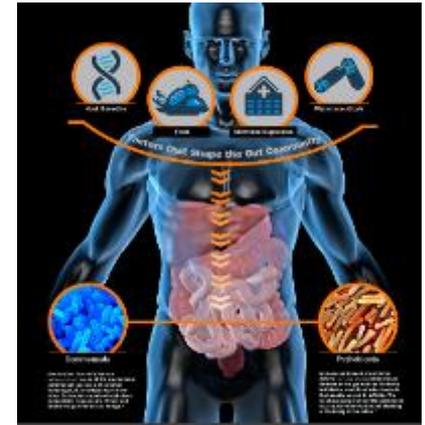
Diet



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

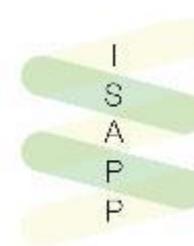
Clinical Guide to Probiotic Products

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:

generalmills.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

Slides will be available after the webinar

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