Feed Your Flora:
How to Promote Healthy Gut Bacteria
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Overview of today’s presentation
• We’ll take a close look at the relationship between gut bacteria and health
• We’ll discuss general recommendations for promoting a healthy gut
  • We won’t be discussing specific medical problems
  • If you have any medical problems related to gut health, consult your physician
• One-on-one nutrition counseling
  • Email askanrd@indiana.edu to schedule an appointment
• Please save questions until the end of the presentation
• Presentation slides will be available at:
  • https://healthy.iu.edu/wellness-information/workshop-handouts.html

What is the gut flora?
• Gut flora: the microorganisms that live in the digestive tract
  • Also known as: Gut microbiome/microbiota/microflora
• Gut flora includes:
  • Bacteria, archaea, fungi, and viruses
The amount of bacteria in the human body

- **Number**
  - 100 trillion bacteria in and on your body (90% in large intestine)
  - Bacterial cells outnumber human cells 10 to 1 (you are 90% bacterial)

- **Species**
  - 10,000 species of bacteria in your body
  - 1,000 species of bacteria in your gut

- **Weight**
  - All the bacteria in your body weigh a total of 2-6 pounds

There are 300 times more bacteria in your gut than there are stars in the Milky Way galaxy.

Beyond the gut...

- Digestive tract
- Skin
- Mouth
- Nose
- Ears
- Eyes
- Genitals
- Respiratory tract
Microbiome as Ecosystem

- Variety of species interacting with each other
  - Species may compete with each other for same food source
  - One species' waste is another species' dinner
  - Increasing/decreasing population of one species may affect many others
- Different ecosystem in different locations
  - Food sources, acidity (pH), temperature, and humidity
  - Different bacteria thrive in different conditions
  - Small alterations can have massive effects on the ecosystem
Functions of the gut microbiome

- Regulates immune function
- Prevents growth of harmful microorganisms
- Fermentation of indigestible food (fiber)
- Production of nutrients
  - Vitamin K2
  - B vitamins
  - Short chain fatty acids (SCFA)
- Influences hormone and neurotransmitter production

Health effects of an altered gut microbiome

- Impaired immune function
  - Increased susceptibility to infection
  - Allergies and auto-immune conditions may be related to altered microbiome
- Increased inflammation, both in the gut and systemically
  - Increases risk of chronic diseases and obesity
- Aging
  - Gut microbiota in older adults is significantly different from young adults
- Altered brain function

Gut Bacteria & The Brain

- Gut bacteria impact many brain functions
  - Sleep regulation
  - Mood
  - Pain sensitivity
  - Appetite regulation
- Stress
  - Bacteria may influence stress response
  - Stress response may alter the microbiome
The development of the microbiome

• Begins at birth
  • Vaginal birth: exposure to vaginal and intestinal microbes
  • C-sections: minimal bacterial exposure
    • Correlate with increased risk of allergies and auto-immune conditions
• Breastfeeding
  • Prebiotics (food for gut bacteria): oligosaccharides
  • Probiotics (live bacteria that populates gut): beneficial bacteria

Antibiotic Use

• An average child is prescribed antibiotics 10-20 times by the age of 18
• Antibiotics are often necessary, but their use alters the microbiome
  • The microbiome may never recover from these changes
  • This may contribute to increased risk of many diseases

Sterile modern lifestyle – Are we too clean?

• Antibacterial soaps and cleaners
• Spending 90% or more of our time indoors
• Aversion to getting dirty
• Lack of beneficial bacteria in food supply
  • Abundance of beneficial bacteria found in dirt/soil
  • Bacteria is reduced in thoroughly washed or highly processed foods
• Dishwashers
Ways to promote a healthy skin microbiome

- Get a dog
- Swim in a natural body of water
- Spend more time outdoors
- Open your windows
- Get your hands dirty (with actual dirt)

Food & The Microbiome

- Dietary changes can significantly alter the microbiome within 24 hours
- The gut microbiome impacts nutrient absorption and production
- Unhealthy diet consequences
  - Nutritional deficiencies from poor diet
  - Nutritional deficiencies from altered microbiome
    - Decreased absorption
    - Decreased production

Feed your Flora with Fiber

- Gut bacteria eat (ferment) fiber.
- Whole plant foods are main sources of fiber
  - Vegetables
  - Fruits
  - Whole grains
  - Beans and legumes
  - Nuts and seeds
- Association between high fiber diet and reduced risk of:
  - Obesity
  - Heart disease
  - Cancer
Types of Fiber

- Fermentable (feeds your gut bacteria)
  - Soluble fiber: Onions, oats, nuts, apples, fruits, vegetables
  - Resistant starch: Unripe bananas, oats, beans, cooked and cooled starches
- Non-fermentable (increases stool bulk)
  - Insoluble fiber: Whole grains, nuts, fruits, vegetables
- Most plant foods contain a combination of soluble and insoluble fiber.
- Some bowel conditions may require restriction of fermentable fiber.

Types of Soluble Fiber

- Inulin
  - Garlic, onion, leek, artichoke, asparagus
- Pectin
  - Pears, apples, plums, oranges (and other citrus fruits)
- Raffinose
  - Beans, cabbage, broccoli, Brussels sprouts
- Eating a variety of soluble fiber sources promotes diversity of gut species.

Inflammation, polyphenols, and gut bacteria

- Less inflammation $\leftrightarrow$ a healthier gut
- Polyphenols (plant-based antioxidant compounds)
  - Anti-inflammatory effects
  - Gut bacteria promote polyphenol absorption
  - Polyphenols promote growth and diversity of healthy microbiome
- Sources of polyphenols:
  - Whole plant foods: vegetables, fruits, whole grains, nuts, beans, seeds, etc.
  - Herbs and spices: garlic, turmeric, ginger, cinnamon, oregano, rosemary, etc.
  - Others: tea, coffee, dark chocolate, red wine, extra virgin olive oil
Probiotics & Gut Health

- May be beneficial for some conditions but research results are mixed
  - Irritable bowel syndrome
  - Inflammatory bowel disease (Crohn’s disease, ulcerative colitis)
  - Diarrhea
  - Constipation
- Adverse effects
  - Probiotics may worsen symptoms in some individuals
  - Immunocompromised should not use probiotics without medical supervision
- Effects may vary based on species, strain, combination, and prebiotics

Prebiotics

- Prebiotics feed gut bacteria
  - Fermentable fiber in foods
  - Prebiotic supplements
- Types of supplemental prebiotics:
  - Fructo-oligosaccharide (FOS)
  - Mannan-oligosaccharide (MOS)
  - Galacto-oligosaccharide (GOS)

Choosing a Probiotic

- In one study, only 1 out of 14 probiotic supplements contained exactly what was listed on the label (some had more, some had less)
- Even the best probiotics may not make it to the gut intact.
- If taking probiotics, you should:
  - Buy from a reliable source
  - Compare the CFUs (colony forming units)
  - Keep refrigerated to maximize shelf life
  - Use before expiration date
Fermented Foods

- Fermented foods may act as natural probiotics
- Fermentation is a traditional way of preserving food
- Fermented foods include:
  - Dairy: yogurt, kefir
  - Vegetables: sauerkraut, kimchi, pickles
  - Soy: miso, tempeh
- Not all versions of these foods act as probiotics. Check the label.

Artificial Sweetener

- Artificial sweeteners may cause alterations in the microbiome that lead to glucose intolerance and metabolic dysfunction.

Avoid produce with high pesticide residues

[Image of the Dirty Dozen and Clean Fifteen lists]
Putting together a healthy diet

- Does your diet feed only 10% of you?
  - 90% of your cells are bacteria
  - Make sure you are feeding them!
- Eat more plants (greater quantity and variety)
  - Aim for consuming at least 30 different plant species per week
- Limit intake of highly processed foods due to:
  - Lack of fermentable fiber
  - Potentially harmful effects of chemical additives and preservatives

Vitamin D

- Vitamin D is another important regulator of the immune system
- Vitamin D deficiency is common (42% of U.S. population)
  - May alter the gut microbiome
  - May trigger immune response to “good” bacteria
  - Associated with increased inflammation in the gut
- Sources of vitamin D
  - Sunlight
  - Food: fatty fish, eggs, fortified foods (milk, cereal, etc.)
  - Supplementation
- Testing your Vitamin D status

Circadian Rhythm

- Circadian rhythm: body’s internal 24-hour clock
  - Gut bacteria have circadian rhythms too!
- Disrupting normal sleep-wake cycle may:
  - Alter the microbiome
  - Increase risk of obesity and chronic disease
  - Gut microbiome composition varies depending on the time of day
    - Less variation is observed in obesity
- Correcting circadian rhythm disruption may help restore the circadian rhythm of the gut microbiome and promote normal metabolism
Correcting your Circadian Rhythm

- Light
  - Avoid artificial light exposure at night
  - Spend time outdoors during the daytime
- Food intake
  - Avoid eating late at night (stop eating within 3-4 hours of bedtime)
  - Start your day with a healthy breakfast
- Get at least 7-8 hours of sleep each night
  - Sleep is also important for limiting inflammation
- Watch “Reset your Rhythm” presentation for more information
  - [https://healthy.iu.edu/wellness-information/workshop-handouts.html](https://healthy.iu.edu/wellness-information/workshop-handouts.html)

Test your own gut bacteria

- American Gut Project
- uBiome
  - [http://ubiome.com/](http://ubiome.com/)
- Both use results anonymously for research purposes
- Results are not intended to diagnose or treat any medical condition

Bristol Stool Chart

- Type 1: Separate hard lumps, like nuts scattered on the plate
- Type 2: Bean-shaped and well formed
- Type 3: Like uncooked pasta, oval or flame
- Type 4: Soft and wider, with some intact segments
- Type 5: Soft and wider, with smooth, oval edges
- Type 6: Lumps that are not formed, but have clearly visible segmental boundaries
- Type 7: Watery, no solid pieces

Constipation

• Approximately 15% of the U.S. population experiences chronic constipation
• Altered microbiome $\rightarrow$ Constipation
• Dietary factors
  • Fiber
  • Water
• Lifestyle factors
  • Physical activity
  • Stress
• Toilet posture: sitting vs. squatting

Squatting is a more natural posture than sitting

• Greater hip flexion $\rightarrow$ straighter recto-anal canal $\rightarrow$ easier elimination
• Squatting may reduce risk of constipation, hemorrhoids, and diverticulosis

Squat toilet
Toilet platform

Nature's Platform™

Toilet Stool

Squatty Potty™

How to improve your toilet posture

Step one

Knees higher than hips

How to improve your toilet posture

Step two

Lean forward and put elbows on your knees.


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How to improve your toilet posture

Step three

Breathe out your abdomen.

Straighten your spine.


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How to improve your toilet posture

Correct position

Knees higher than hips.

Lean forward and put elbows on your knees.

Straighten your spine.

Feed Your Flora Tips

**Diet**
- Eat a whole food based diet that includes good sources of fiber
- Consume at least 30 different plant species each week
- Include fermented foods in your diet
- Avoid intake of highly processed foods
- Avoid artificial sweeteners

**Lifestyle**
- Incorporate stress management practices into your daily routine
- Engage in regular physical activity
- Spend more time outdoors
- Correct circadian rhythm disruption
- Consider squatting instead of sitting

References

- American Chemical Society. The precise reason for the health benefits of dark chocolate: mystery solved. 2014.
References


Questions?

For additional questions, or to schedule a one-on-one nutrition counseling appointment, email: gskanrd@indiana.edu