Probiotics 101

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Probiotics 101

• Basics of probiotics & prebiotics
• How probiotics are named
• Benefits of taking probiotics
• Occasions for use
• Skin health and probiotics
• Probiotic-8 features & benefits

Nexium Nation

• Digestive problems – from constipation to lactose intolerance – affect up to 70 million Americans
• With sales of $5 billion, Nexium was the second largest selling drug in the U.S. in 2009
  - decreases the amount of acid produced in the stomach
• Constipation is one of the most frequent gastrointestinal problems in the U.S.; the primary cause is lack of fiber
• Adults experience 4 bouts of diarrhea on average per year. Causes include infections, reaction to medications, internal disorders (celiac disease, Crohn’s disease or IBS), food allergies or intolerances (lactose intolerance)
What are Probiotics?
• Probiotic means “for life”; probiosis means a symbiotic relationship between two organisms
• Living microorganisms that benefit the host by improving the balance of intestinal flora
• Most probiotics are bacteria but not all e.g., Saccharomyces boulardii is a yeast
• Over 400 types of bacteria found in the intestinal tract
• Stress, illness, antibiotics, medications, aging & diet influence intestinal flora

Interesting Things About Probiotics
• What’s your gut type? Researchers have identified 3 enterotypes – the composition of the microbial flora
• Animal studies have shown that daily intake of L. plantarum HEAL19 helps prevent obesity and reduce the body’s low level inflammation
• “Hygiene hypothesis” – increase in allergic diseases (asthma, atopic dermatitis) is through lack of early exposure to bacteria
Major Probiotic Families

<table>
<thead>
<tr>
<th>Family:</th>
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<tbody>
<tr>
<td>Lactobacillaceae</td>
<td>Bifidobacteriaceae</td>
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<tr>
<td><strong>Genus:</strong></td>
<td><strong>Genus:</strong></td>
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<tr>
<td>Lactobacillus</td>
<td>Bifidobacterium</td>
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<tr>
<td>(primarily reside in small intestine)</td>
<td>(primarily reside in large intestine)</td>
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<tr>
<td><strong>Species:</strong></td>
<td><strong>Species:</strong></td>
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<tr>
<td>L. acidophilus</td>
<td>B. bifidum</td>
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<tr>
<td>L. casei</td>
<td>B. lactis</td>
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<tr>
<td>L. rhamnosus</td>
<td>B. thermophilus</td>
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<tr>
<td>L. salivarius</td>
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Naming of Probiotics

- Probiotics are identified by family, genus, species and strain
  - Listed in italics
  - First letter of family name often used for brevity

- Strain Examples:
  - Bio-K: L. acidophilus CL1285 and L. casei LBC80R
  - Dannon Activia: B. lactis DN-173 010 (marketed as Bifidus Regularis)
  - Yakult: L. casei Shirota

- Benefits observed from a specific strain do not necessarily correlate to the same species of a different strain

Lactic Acid Producing Bacteria

- Most but not all probiotics are lactic acid producing bacteria (LAB)
- LAB produce large quantities of lactic acid
- LAB convert carbohydrates to lactic acid; as a result they can help relieve the symptoms of lactose intolerance
  - Reduce lactose content by “pre-digesting” some of the lactose and metabolizing to lactic acid
- Some probiotics only produce lactic acid; others also produce acetic acid, ethyl alcohol and carbon dioxide (makes large holes cheeses); serves to lower pH of intestines
Fermented Dairy Products

- Dairy products that have been fermented using lactic acid producing bacteria; preserves the food
  - L. acidophilus, S. thermophilus, L. bulgaricus
- Most well-known fermented dairy product is yogurt
- “Live Active Culture” seal ensures that product contains 10^8 viable lactic acid bacteria per gram at time of manufacture
- Most yogurts have relatively low CFU count (1-2 billion); acidophilus drinks like Yakult have much higher counts (18 billion)

Probiotic Products

Probiotic Considerations

- Colony Forming Units & survival of live active cultures
- Single strain or multi strain
- Health objective & benefits sought
- Prebiotic inclusion
- Occasion for usage
- Product delivery system (dairy or non-dairy, functional food, nutritional supplement)
Colony Forming Units

- Referred to as CFUs
- Indication that the bacterium is alive and capable of dividing and forming colonies
- Higher levels do not necessarily mean the probiotic is better
- CFU levels range by product:
  - Many products offer 1 billion of single or multiple strain
  - Number of products offer higher CFU counts – 10 to 50 billion range
  - VSL#3 has 450 billion CFUs

Single Strain vs Multi Strain

- Depends on health objective
- Many single strain formulations are *L. acidophilus*
- Majority of supplements are multi-strain
- For digestive and immune health, ideal to have strains from *Lactobacilli* and *Bifidobacterium* families

Key Probiotic Benefits

Replenish the beneficial bacteria in the digestive tract which benefits the host by:

- Supporting digestive function:
  - Shortens transit time which promotes regularity and increases stool volume and weight
  - Resolves diarrhea (caused by bacteria or viral infection and antibiotic use) by balancing the intestinal flora
  - Help relieve gastrointestinal symptoms associated with lactose intolerance

- Strengthening immunity:
  - Over 70% of body’s immune system is located in the digestive tract where specialized cells play an important role as first line of defense against invading bacteria
  - Beneficial bacteria occupy the lining of the intestinal tract and create a physical barrier to pathogens
  - Regular consumption of probiotics strengthens this lining
What are Prebiotics?

- Prebiotics are special type of non-digestible carbohydrate that beneficial microorganisms use as energy.
- With a readily available food source, beneficial bacteria can replicate in the intestinal tract.
- While probiotics directly repopulate the intestinal tract with the beneficial bacteria, prebiotics provide an environment which is hospitable to the good bacteria.
- The most widely accepted prebiotics are inulin—a type of FOS or fructooligosaccharides.
- A synbiotic is a probiotic that is combined with a prebiotic.
- Good sources include chicory, Jerusalem artichoke, jicama, leek, onion, asparagus, banana.

Occasions for Probiotic Use

- Post antibiotic treatment where antibiotics routinely prescribed (week of Nov 14th is “Get Smart About Antibiotics Week”): following surgery to prevent infection, acne treatment protocol to reduce overgrowth of P. acnes.
- Gastric Distress — infectious diarrhea due to water or food contamination, infection from H. pylori (bacteria that causes most ulcers & chronic stomach inflammation).
- Specific health issues — tooth decay and periodontal disease, women’s health issues e.g., vaginal infections and UTIs, children’s health issues e.g., stomach & respiratory infections acquired in daycare.
- Relieve symptoms from chronic digestive disorders (e.g., Irritable Bowel Syndrome, Inflammatory Bowel disease e.g., Ulcerative Colitis, Crohn’s Disease).

Skin Health & Probiotics

- Interest in the skin’s microbiota is a rapidly developing area of cutaneous biology.
- Epidermal keratinocytes have the potential to affect skin microflora by producing antimicrobial peptides.
- Probiotics selectively inhibit detrimental bacteria while preserving/stimulating beneficial bacteria.
- Skin microflora, skin barrier function and the skin immune system are closely linked; form a complex, highly regulated network that controls skin functions.
- Probiotics induce systemic effects which extend beyond the gut; and even affect selected functions of the skin; cause beneficial effects in healthy as well as diseased skin.
Microflora of Skin

- Composed of limited number of microbial types to unique environmental conditions of the including physical and biochemical factors

- Resident microbial species:
  - Reproducing populations e.g., Propionibacteria (P. acnes, P. avidum, P. granulosum), Staphylococci (S. epidermidis), Micrococci, Corynebacteria and Acinetobacter, Malassezia yeast
  - Fills a niche that could otherwise be colonized by pathogenic microorganisms
  - Play a role in skin's immune response by inhibiting growth or killing microorganisms
  - Only when host becomes compromised by changes in immune defense that resident microflora display pathogenic potential e.g., acne

- Transient microbial species:
  - No capacity for sustained growth e.g., Staphylococcus aureus, Escherichia coli, Pseudomonas aeroginosa and Bacillus species

Studies: Probiotics and Eczema/Dermatitis

- Atopic dermatitis (type of eczema) is common in babies, young children

- Manifestation of dysfunctional immune system

- Certain strains of probiotic bacteria modulate infant immune system development

- A significant improvement on the course of atopic dermatitis in infants given probiotic-supplemented diets

- Probiotics increasingly being used as functional ingredient in baby foods much like Omega-3s

Conventional Acne Treatment

- In acne patients, overgrowth of P. acnes is commonly observed

- Antibiotics or antibacterial agent treatments kill S. epidermidis, beneficial bacteria that protects skin from infections & other environmental insults

- In acne patients, goal is to rebalance the growth of P. acnes at the same time preserving beneficial skin microbiota

- Promoting development of good skin bacteria like S. epidermidis could positively affect skin barrier function & development of innate immune response in skin
**Study: Probiotics and Acne**

**Study Method:**
- 16 patients, mean age 21.8 years
- Treatment group: Fermented milk with 200 mg lactoferrin (Praventin)

**Study Results:**
- Consumption of Lactobacillus-fermented dairy beverage improved the clinical aspects of acne at 12 weeks:
  - 39% fewer inflammatory lesions
  - 23% fewer total pimples
  - 31% decrease in sebum content
  - 20% decrease in acne grade

**Study Findings:**
- Demonstrated that lactoferrin has anti-inflammatory activity; after consuming probiotics, systemic immunomodulation occurs, including beneficial effects on the decreases in sebum content and total acne lesions in acne symptoms.

**Healthy Skin & Probiotics**

Healthy skin can benefit from probiotics.

**Enhanced UV Protection:**
- Studies in mice and humans demonstrate that supplementation with probiotics protects the skin’s immune system against ultraviolet radiation.

**Improvement in Skin Barrier Function:**
- Study showed in women with dry, sensitive skin, after taking a fermented dairy product for 24 weeks:
  - Significant reduction in transepidermal water loss
  - Improved stratum corneum barrier function

**Study: Probiotics and Anti-Aging**

- Study conducted by Nestle
- Demonstrates combination of probiotic with antioxidants protects the skin from UV damage by activating the skin’s natural immune defenses
- In 2009, launched Inneevo Solaire with Skin Probiotic in Europe (probiotic plus beta-carotene, B2, B3, vitamin C and vitamin E)
Probiotic-8

- Formulated with 8 different species of beneficial flora including strains of Lactobacillus, Bifidobacterium and Streptococcus.
- Guaranteed to contain a minimum of 8 billion live beneficial bacteria per serving.
- Favorably alters intestinal balance, promotes healthy digestion and improves absorption of vitamins and nutrients.
- Formulated with FOS prebiotic fiber for optimum symbiotic support.
- Enteric coated capsules deliver microflora directly to the intestine, bypassing the harsh acidic conditions of the stomach. Enteric coating also protects the live beneficial bacteria for 18 months.
- Ideally suited for daily use or after a course of antibiotics.
- Product does not require refrigeration.
- SRP: $38.00

Probiotic-8 – 8 Strains with 8 Billion CFUs

- Lactobacillus: 6 Billion
- Streptococcus: 800 Million
- Bifidobacterium: 1.2 Billion

Lactobacillus Group – 4 strains

- *Lactobacillus acidophilus* (La-14) - promotes synthesis of vitamin K, produces lactase and anti-microbial substances
- *Lactobacillus casei* (Lc-11) - one of the most widely studied, resists gastric acid, survives journey to GI tract, lowers pH of digestive system, helpful against antibiotic associated diarrhea
- *Lactobacillus rhamnosus* (Lr-32) – remarkably tolerant of harsh acids found in digestive tract, eliminates & prevents growth of harmful bacteria in intestines, beneficial to immune system
- *Lactobacillus salivarius* (Ls-33) – Low dose required, produces enzymes that kill bad bacteria, thrives on FOS
**Bifidobacterium Group – 3 strains**

- *Bifidobacterium bifidum (Bb-02)* – natural colonizer of digestive tract; survival depends on food source (FOS); aids in digestion

- *Bifidobacterium longum (Bl-04)* – increases acidity of GI tract making inhospitable environment for pathogens; beneficial in preventing diarrhea associated with antibiotic use, helps in production & absorption of B-complex

- *Bifidobacterium lactis (Bl-04)* – one of the most commonly found beneficial bacteria in intestines; used in yogurts; helps relieve constipation

**Streptococcus Group – 1 strain**

- *Streptococcus thermophilus (St-21)* – can withstand elevated temperatures, making important for pasteurized dairy products; supports immune function

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**Directions**

**After Antibiotic Use:**
- Use after antibiotic course is completed
- 2 capsules, twice daily, between meals

**Daily Use:**
- 1-2 capsules daily between meals

**Precaution:**
- Taking probiotics on an empty stomach helps to eliminate any gas or bloating that may be experienced
Probiotic-8 = Happy Road Trip

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