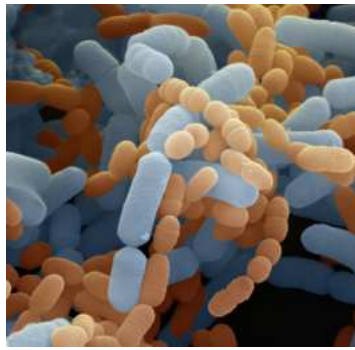
Choosing the Right Probiotic

Robert Dadd

Master Herbalist : Flora Health Canada

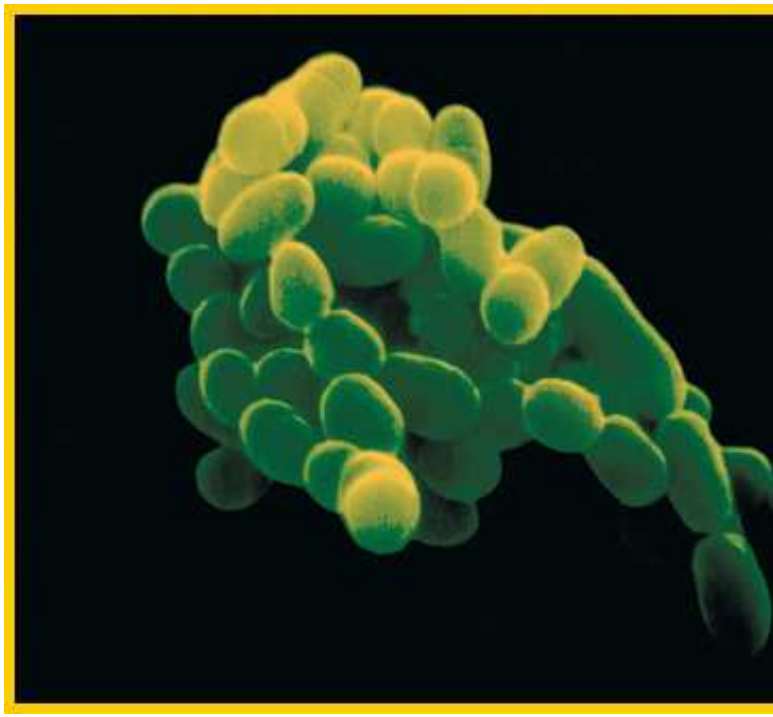
What is the “Microbiome”?



- The community of microorganisms that inhabits our bodies
- Skin, mouth, nose, digestive tract, and vagina
- 1.3 bacterial cells to each 1 human cell (recent re-estimate)
- Between 300 to 1000 different species
- Contributes to both health and disease
- Probiotic or microbiotic = microorganism that confers a health benefit

Features to Look For in a Probiotic

- Human adapted strains
- Age and body/condition specific formulas
- Laboratory/QA tested for gastric acid and bile resistance
- Stability tested (Manufacture and Expiry dates)
- Excipients selected for maintaining optimal stability – keeping moisture out and your strains alive/dormant



Quality

- Each probiotic strain selected based on ability to pass numerous quality control tests
- Measured as “**colony forming units**” (CFUs) or “viable probiotic cells”, as opposed to dead cells
- **Testing:** gastric acid and bile resistance, enzymatic activity, the ability to implant and adhere in the intestines, antibiotic susceptibility, and compatibility with other probiotics
- As a result, **enteric coating** is not required
- **Die off rates for robust strains:** In the refrigerator the die-off rate is approximately 3-4% per month. At room temperature: approximately 1% each day. This also assumes good manufacturing and use of excipients.
- **Potency** based on stability studies should be labelled for both time of manufacture and expiry

2013 Probiotic Potency Study

- **Recovery of Viable Bacteria from Probiotic Products that Target Oral Health in the journal 'Probiotics and Antimicrobial Proteins'**
- **Five brands** of probiotics marketed for oral health were tested for the recovery of viable bacteria:

- Udo's Choice® Super 5 Probiotic Lozenges
- Life Extension Advanced Oral Hygiene
- Nature's Plus Adult's Dental Care Probiotic Lozenges
- TheraBreath Multi Symptom Probiotics
- Garden of Life Probiotic Smile

2013 Probiotic Potency Study: Results

- Udo's Choice® Super 5 stood out from the rest numerically and statistically when all brands were stored in the refrigerator
- Udo's Choice® was the only brand for which the label directed refrigerated storage
- Udo's Choice® was the only brand for which the number of viable bacteria recovered met the recommendations for daily dosage of a probiotic regimen
- No viable bacteria were recovered from Garden of Life lozenges

- https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3762494/

Manufacturing

- Probiotic library of “mother” strains kept frozen at -80 C
- Strain-specific culture medium prepared (sugars, proteins, minerals)
- Each strain introduced to their growth media
- Fermentation and bacterial growth ensues under controlled conditions

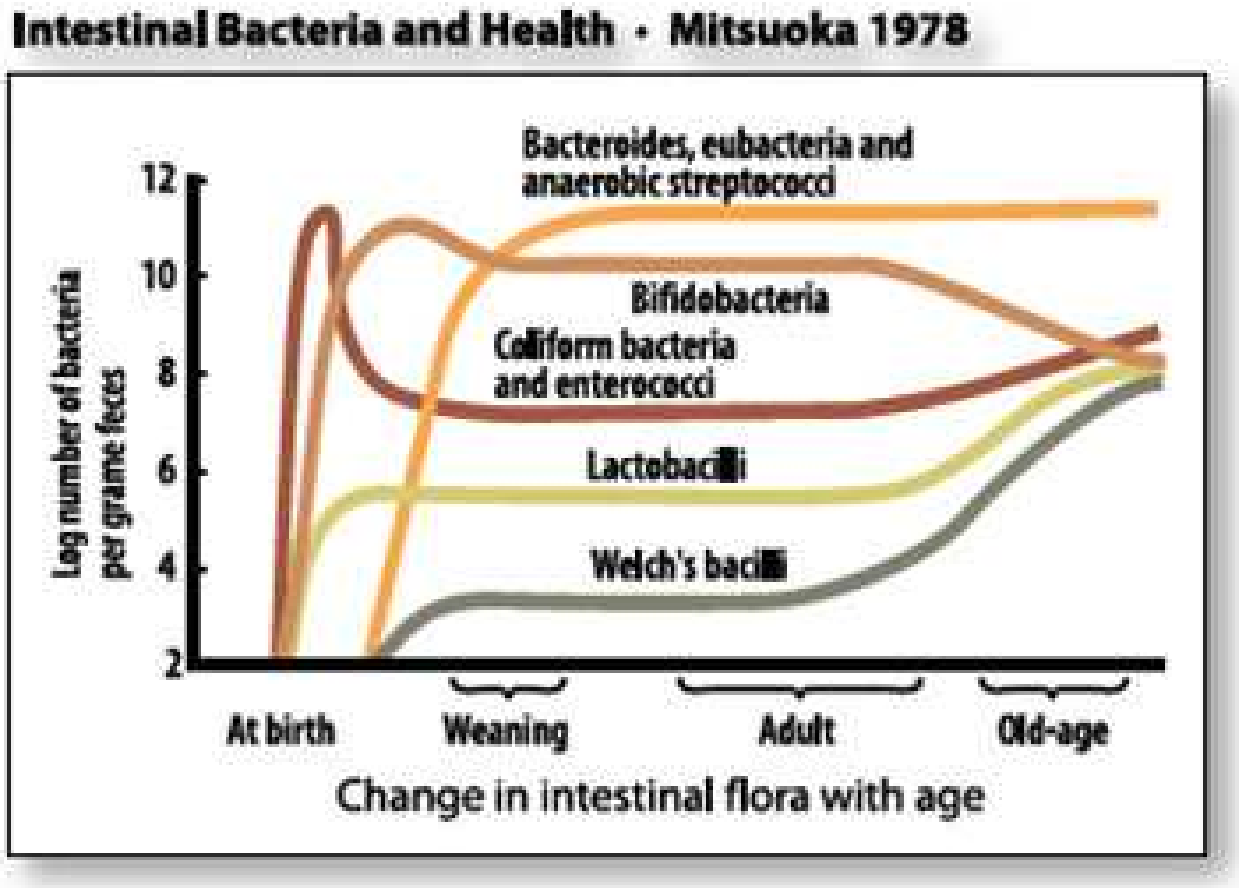
Manufacturing

- Centrifugation/ultra-filtration step to remove water and concentrate live bacteria; cryo-protectants added
- Freeze-drying stage – remainder of water removed and bacteria form solid “cake”
- Milling to a fine powder
- Blending of formula with excipients and packaging

Excipients – “Non-medicinal ingredients”

- Potato starch: carrier base, keeps moisture out
- Hydroxypropyl methyl cellulose: the cellulose of the vegetarian capsule; from softwood trees
- Ascorbic acid: antioxidant; supports stability
- Stearic acid: glidant/flow agent during encapsulation; aids disintegration of capsule and dispersal of probiotics in the stomach
- Silicon dioxide: anti caking agent; keeps moisture out; anti-static and glidant during encapsulation
- These all are key to maintain the potency of live bacterial cells in a formula

Change in Intestinal Flora with Age:
Gut microbiome changes with time/age, health and diet



Age Specific: Infants

- 2013 CMAJ: 24, four month old infants
- 35% Bifidobacteria; bacterial richness and diversity lower amongst C-section delivery
- Probiotics: crucial for immune system development, intestinal homeostasis and digestive metabolism
- Dysbiosis associated with autoimmune diseases, inflammatory intestinal diseases, and metabolic diseases (diabetes, obesity)

Age Specific: Infants & Children

- *Lactobacillus casei* – diarrhea
- *Lactobacillus rhamnosus* - reducing allergies and atopic eczema, and IBS symptoms in children
- *Bifidobacterium infantis* – one of the first colonizers; great at digesting and flourishing on human milk sugars and proteins; inhibits growth of pathogens; subspecies of *B. longum*
- *Bifidobacterium bifidum* – species transmitted to child during vaginal birth
- *Bifidobacterium breve* – another species common to infants and researched for benefits in colitis

Age Specific: Children

- *Lactobacillus plantarum* – commonly found in fermented foods; antimicrobial

- *Lactobacillus fermentum* – research focused on aiding cholesterol metabolism, inhibiting pathogenic bacteria and anti-inflammatory properties in the gut
- *Lactobacillus acidophilus* – decreases incidence of diarrhea, antimicrobial, aids digestion of lactose
- *Bifidobacterium bifidum* – reduces chances of acute diarrhea, discourages pathogens

Age Specific : Adults and Seniors

- *Lactobacillus casei* - trials of AAD and *C. difficile* infections, suppresses pathogenic bacteria, improves intestinal permeability
- *Bifidobacterium bifidum* – reduces chances of diarrhea and inhibits *E.coli* growth

- *Bifidobacterium breve* – anti-inflammatory properties
- *L. plantarum* HA-119: very good antimicrobial effects vs. intestinal pathogens; one of the best for adhering to human intestinal lining – both small and large intestine.

Age Specific: Seniors

- Higher percentage *Bifido* strains beneficial; some research shows reduction in intestinal inflammatory markers and improvements in adaptive immunity in seniors
- 2 especially common in adults:
- *Bifidobacterium bifidum*
- *Bifidobacterium longum*

Focus on Colon Health

- *Bifidobacterium breve*
- *Bifidobacterium longum*
- *Bifidobacterium bifidum*
- Supports health of colon, bowel regularity, immune health
- Bacteria ferment fibre to create short chain fatty acids
- Eg. Acetic, Propionic, Butyric
- SCFAs aid in creating a healthy immune response (anti-carcinogenic) in the colon, reducing inflammation and providing energy for colon cells
- Butyric acid especially good at reducing symptoms of ulcerative colitis and Crohn's disease

Oral Health

- *Lactobacilli* species of probiotics have shown promise in some clinical studies for their ability to produce anti-microbial substances that act against oral pathogens linked to dental caries, reduce inflammation of the gums and reduce halitosis (bad breath)
- *Lactobacillus acidophilus*
- *Lactobacillus casei*
- *Lactobacillus rhamnosus*
- *Lactobacillus salivarius*
- Xylitol makes a perfect sweetener for use with them in products (antibacterial)

Condition Specific: Anti-Microbial Support

- *Lactobacillus acidophilus*
- *Lactobacillus rhamnosus*
- *Lactobacillus plantarum*
- *Lactobacillus casei*
- *Lactobacillus salivarius*
- Suppress overgrowth of pathogenic bacteria and yeasts
- They produce lactic acid and hydrogen peroxide

General Probiotics Research Findings

- Stimulate non-specific host resistance to microbial pathogens
- Promote gut-barrier functions, maintain gut permeability, increase mucin secretion
- Secrete antimicrobial substances, including lactic acid and hydrogen peroxide
- Out-compete pathogenic bacteria for nutrients
- Give maturational signals for the gut-associated lymphoid tissues (GALT)
- Balance the generation of pro- and anti-inflammatory cytokines[1]
- Aid in manufacture of short chain fatty acids and vitamins (B vitamins, vitamin K, folic acid)
- *Lactobacilli* bacteria have been shown to protect against traveler's and antibiotic induced diarrhea[2]

General Probiotics Research Findings

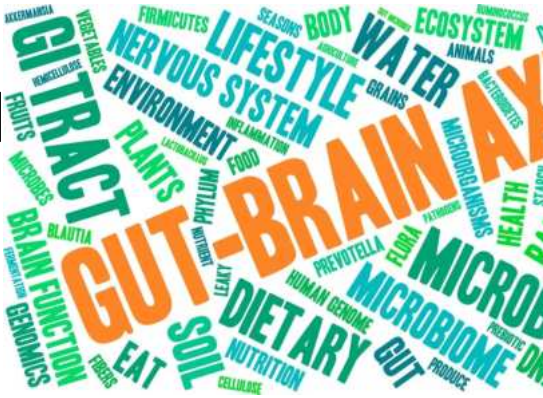
- *Lactobacilli* also help protect against UTIs by colonizing the mucous membrane lining, producing anti-microbial substances, and producing surfactants that have anti-adhesive properties so pathogenic bacteria have a more difficult time taking root[3,4]
- Studies have also shown probiotics help restore vaginal microflora.[5]
- *Lactobacillus* and *Bifidobacterium* probiotics have shown a cholesterol-lowering effect
- They help break bile acids into free acids that are rapidly excreted from the intestinal tract. After this excretion, the synthesis of new bile acids from cholesterol lowers its concentration in the body[6,7,8]
- Influence CNS – gut/brain connection (HPA axis) – neurotransmitter production[9]

Probiotics and the Gut-Brain Axis

- Signaling system including the CNS, neuroendocrine system, enteric nervous system and the vagus nerve, as well as the gut “microbiota”, or probiotics
- Allows “cross-talk” between our brains and digestive system
- Associated with a positive influence on our stress response, anxiety levels, and depression

Gut-Brain Axis Clinical Results

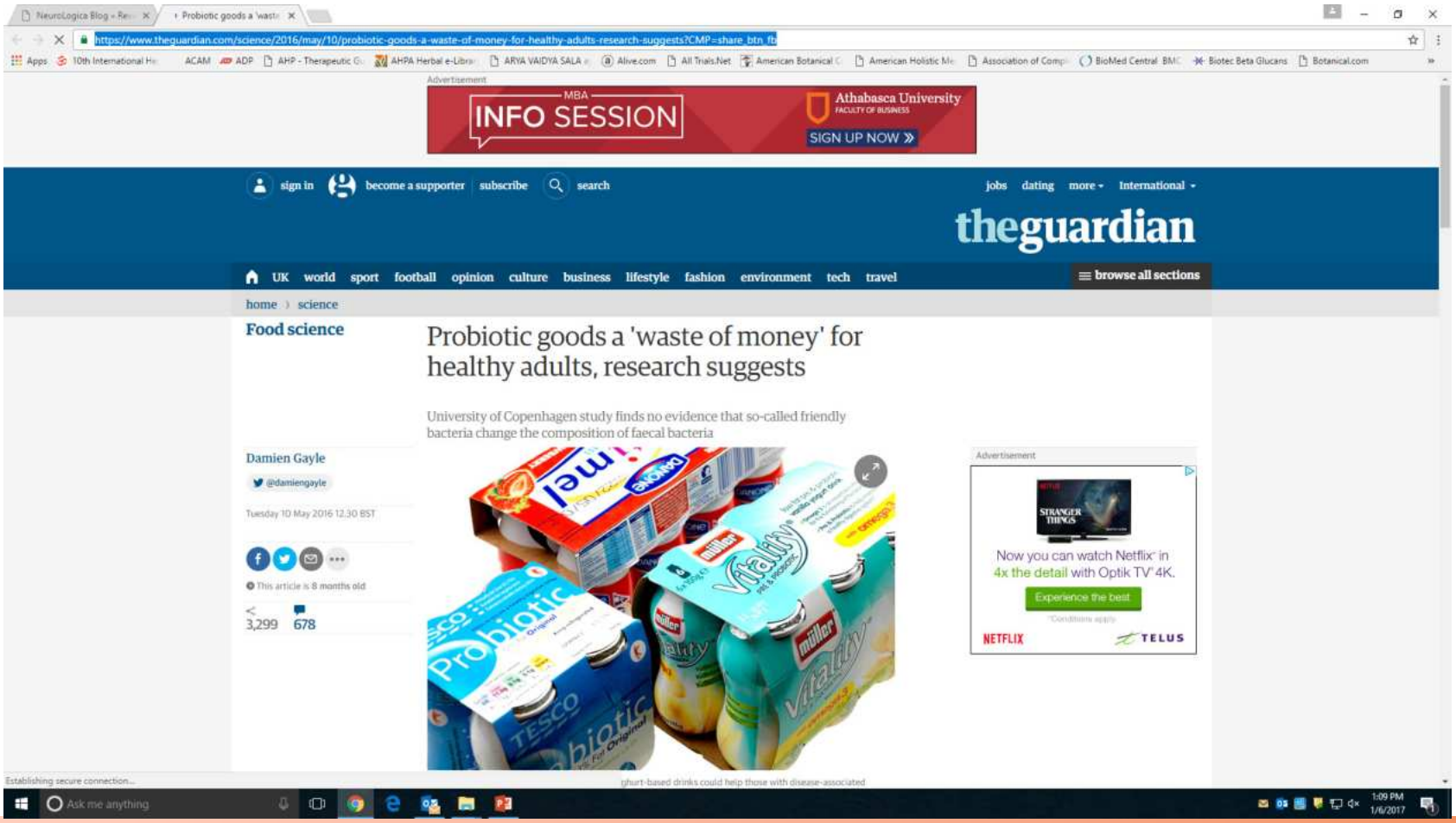
- *Lactobacillus helveticus* and *Bifidobacterium longum* significantly reduced psychological distress compared to a placebo group
- A multi-species probiotic reduced negative thoughts associated with sad mood over 4 weeks in a placebo controlled trial
- Lactobacillus and Bifidobacteria species taken for 12 weeks had a moderate but significant improvement in the score of elderly Alzheimer's patients on the Mini-Mental State Examination (MMSE) scale, a standard measure of cognitive impairment



Timing of When to Take a Probiotic

- **Tompkins, TA, et al. The impact of meals on a probiotic during transit through a model of the human upper gastrointestinal tract.** *Beneficial Microbes, December 2011; 2(4): 295-303.*
- "We conclude that ideally, non-enteric coated bacterial probiotic products should be taken with or just prior to a meal containing some fats."
- Minimal losses of both Lactobacilli and Bifidobacteria species, non-microencapsulated
- Water and saliva helped buffer vs. acid until the food arrived
- Survival when taken 30 minutes after a meal was poor

Negative Research



Alterations in fecal microbiota composition by probiotic supplementation in healthy adults: a systematic review of randomized controlled trials. Genome Medicine.2016

- "A Danish team looked at the results of seven trials of the products – often sold as milk-based drinks, biscuits, sachets, or capsules – and found no evidence they changed the composition of faecal bacteria in healthy adults."
- 1. was potency tested?
- 2. Changing faecal bacteria composition is not a sign of efficacy. Trillions of bacterial cells with 300 to 1000 different species. Supplementing won't necessarily alter results in feces and depends on how fine-tuned a measurement they use.
- "The real impact of the probiotics may have been masked by small sample sizes and the use of different strains of bacteria and variations in participants' diets, among other factors."
- *C. difficile* example – magnitude of effects from small amounts

Refrigeration vs. Shelf Stable

- Strain resilience
- Additional drying steps
- More excipients and “overage”
- “Shelf stable” probiotics would still benefit from refrigeration
- A relative term

Human Strains

- Human adapted
- Can implant and adhere to human intestinal lining and persist there (8-10 days after supplementation stops)
- Part of the strain characteristics
- Even strains that may have originally been sourced from dairy or plants
- Not “sourced from humans” but may have been originally identified that way

Some Misconceptions

- Species vs. Strains
- Species = *Lactobacillus rhamnosus (eg.)*
- Strain = *Lactobacillus rhamnosus* + strain designation (numbers and letters usually)
- Characteristics of one strain may be different than others
- Potency (cell count numbers) matters but it is not strictly a game of numbers – quality and strain characteristics are also hugely important

Some Misconceptions

- Multi-Strain vs Single Strain
- Unique “fingerprint” for each of us – may respond differently to each strain
- Multi-Strain will usually cover both large and small intestine
- Single strain are often based on specific clinical research
- Research review: mono-strain, multi-strain and multi-species probiotics--A comparison of functionality and efficacy
- Human and animal studies (AAD in children, protection against pathogenic bacteria in animals, etc.)
- Multi-strain superior: “strains used in multi-strain and multi-species probiotics should be compatible or, preferably, synergistic. The design and use of multi-strain and multi-species probiotics should be encouraged.”

Some Misconceptions

- Pre-biotics and Probiotic Foods
- Prebiotics like FOS included in a capsule seems gimmicky – a pinch of powder that won't necessarily benefit growth of all strains (need at least 1g)
- Prebiotics are already plentiful in our diet
- Fibre, seaweeds, fruits and vegetables like bananas, avocados, artichoke and asparagus, and starchy, tuberous vegetables like yams and cassava
- Probiotic foods (kefir, yogurt, sauerkraut, miso, etc.) are great additions but usually have small amounts of microbiotics of unknown quality/potency

Thank You

- Any Questions? Please type them in the question box or email later to: info@savant-health.com