

Prebiotics and Probiotics: Supporting gut health during and after cancer treatment



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UNC
CANCER CARE

Human Microbiome



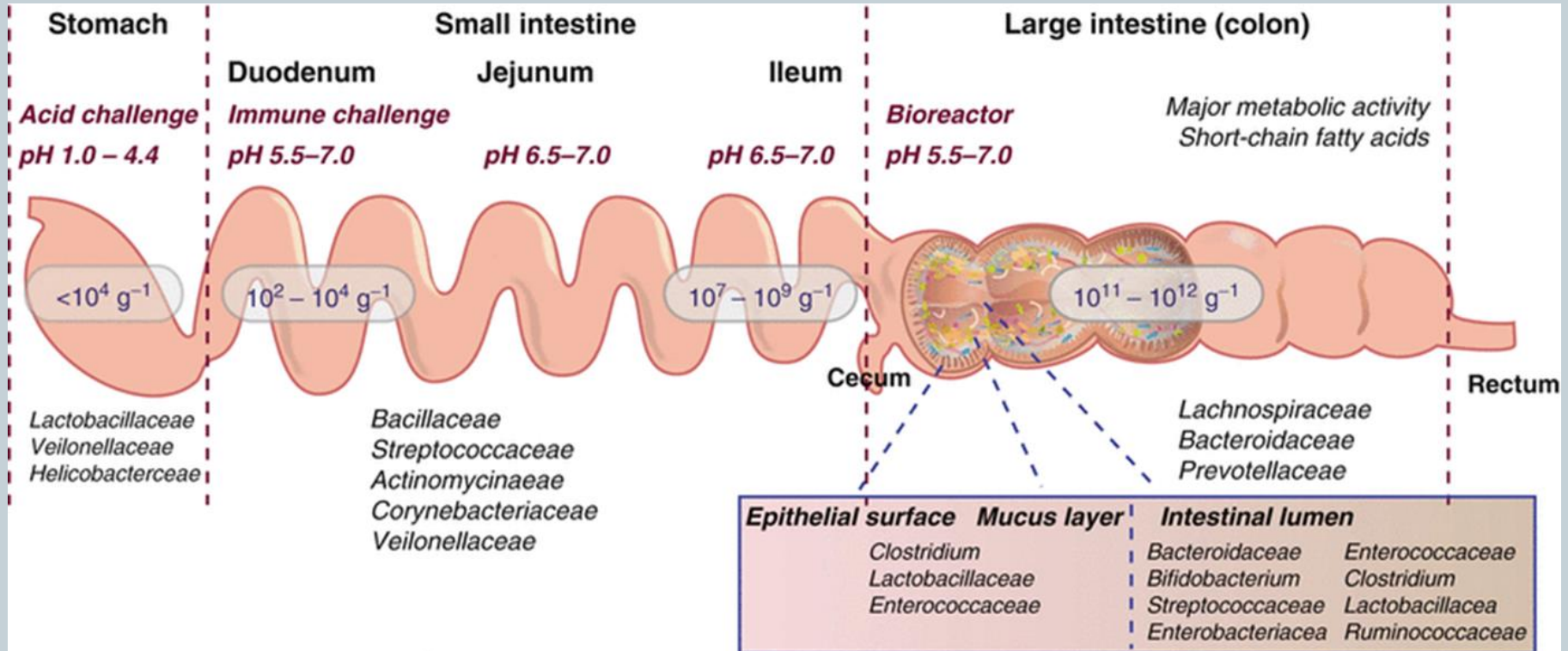
- Organisms living in gut, mouth, skin and, other body parts
- Acquired from the environment at birth



Gut Microbiota



~99% of human microbes exist in the GI tract



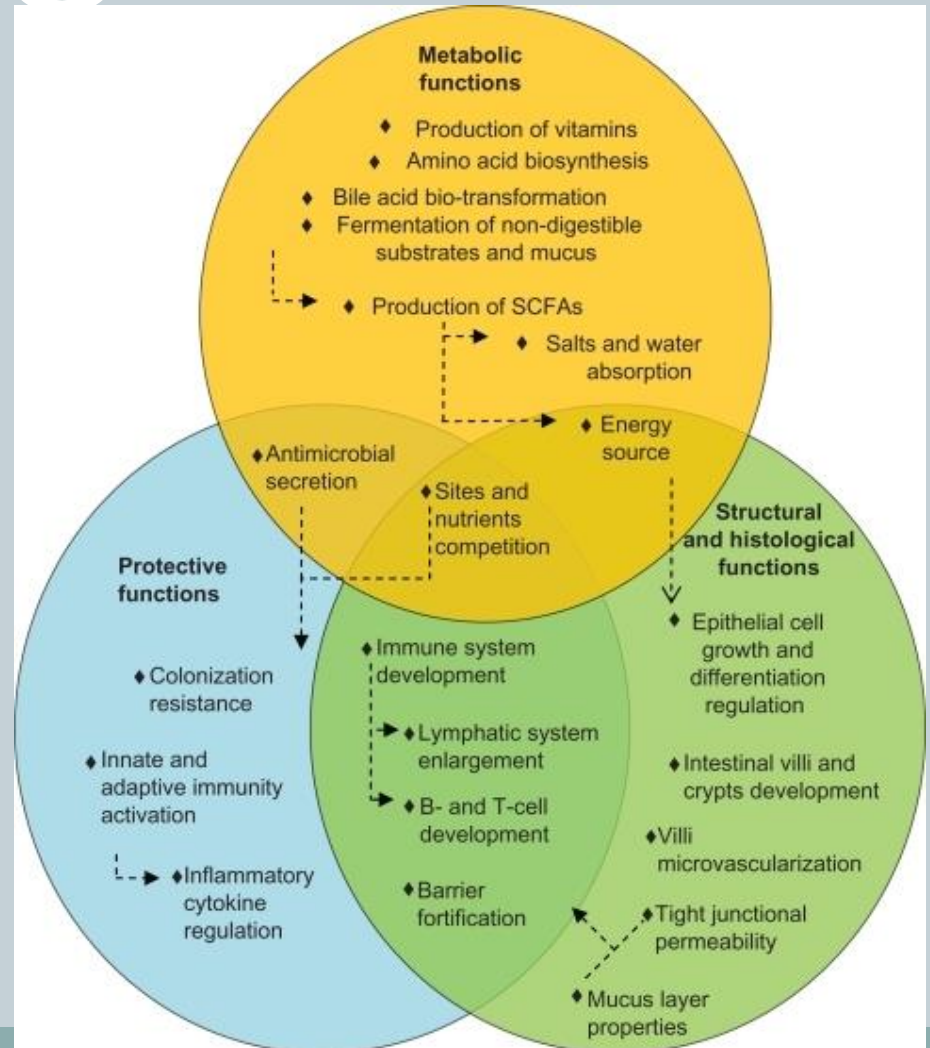
Function of Gut Microbiota



- Germ free mice can exist and survive, but...
- Abnormalities of:
 - Immune function (*oral tolerance*)
 - Metabolic function (*altered enzymes*)
 - Physiological function (*altered motility*)
 - Trophic function (*altered cell turnover*)

Functions of Gut Microbiota

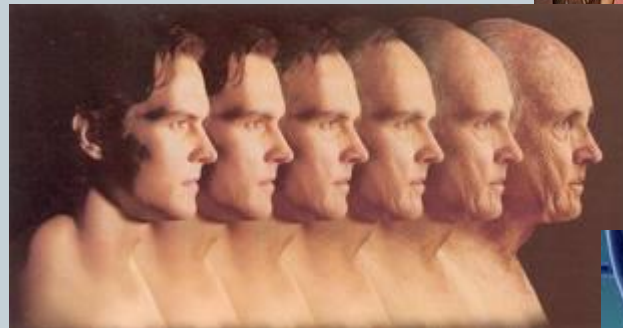
- Trophic/
Immunological
- Protective
- Metabolic



Factors Affecting Gut Microbiota



- Unmodifiable
 - Age
 - Genetics
 - Race

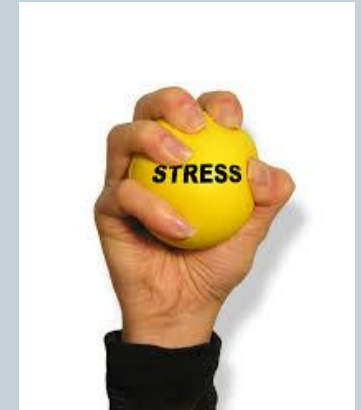


Factors Affecting Gut Microbiota



- **Modifiable**

- Diet
- Medications
- Stress management
- Physical Activity



Diet and Gut Microbiota



- Plant-based vs animal-based diet
- Simple carbs and sugar
- Artificial sweeteners
- Emulsifiers
- Vitamin D deficiency

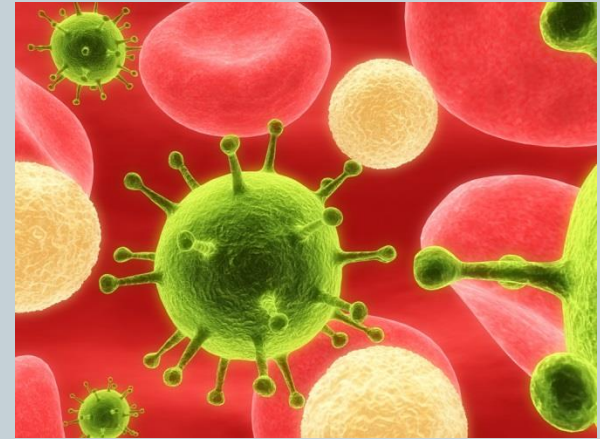


Turnbaugh et al. *Nature*, 2013
Suez et al. *Nature* 2014
Chassaing et al. *Nature*, 2015
Ooi et al. *J Nutr*, 2013

Health Risks and Microbiota



- Functional bowel disorders
- Inflammatory bowel diseases
- Allergies
- Obesity
- Diabetes
- Mood and anxiety disorders
- Cancer



Turnbaugh et al. *Nature* 2006
Sanders et al. *J Clin Gastroenterol* 2011
McCoy et al. *PLoS One* 2013

Probiotics



- “Good” bacteria and yeast providing benefits to the host
- Similar to those naturally found in gut
- *Saccharomyces boulardii* (a yeast) and *Lactobacillus* and *Bifobacterium*
- Supplements and food sources

Food Sources of Probiotics



- Yogurt
- Fermented milk (kefir, acidophilus milk)
- Buttermilk
- Miso, tempeh, some soy drinks
- Some soft cheeses
- Kim chi, sauerkraut, many pickles
- Kombucha (fermented black tea)



Probiotic Supplements



- Not all ‘probiotics’ are the same
- Choose products with “live” bacteria
- Buy from reputable manufacturers
- Effective minimum dose



Probiotic Supplements



- Read the label:
 - Microbe
 - CFU (Colony Forming Units)
 - Expiration date
 - Suggested serving size
 - Health benefits
 - Proper storage conditions
 - Corporate contact information

Specific Probiotic Recommendations



- IBD→VSL#3
- Ulcerative Colitis maintenance→E.coli Nissle, VSL#3
- IBS→Bifidobacterium infantitis, VSL#3
- Atopic eczema w/ cow milk allergy treatment→ LGG, Bifidobacteriumlactis
- Antibiotic associated diarrhea→S.boulardi, LGG, L.casei, L. bulgaricus, S.thermophilus
- C.diff associated diarrhea→S. boulardi, LGG

Probiotics: Help or Hurt?



- Generally considered safe
- Possible side effects
 - Allergic reaction
 - Mild stomach upset
 - Diarrhea
 - Flatulence/bloating
- Caution with immunosuppressed patients

Prebiotics



- Natural, non-digestible food ingredients that are linked to promoting the growth of helpful bacteria in your gut.
- “Good” bacteria promoters
- Examples: FOS, galacto-oligosaccharides, lactulose, resistant starches
- Currently no recommendations

Prebiotics



- **Food sources**

- Oatmeal
- Flax
- Barley
- Other whole grains
- Onions
- Greens (dandelion greens, spinach, collard greens, chard, kale, and mustard greens)
- Berries, bananas, and other fruit
- Legumes
- Jerusalem artichokes
- Chicory
- Asparagus



Gut Microbiota and Cancer



- Gut bacteria regulate bile acid metabolism
- High protein diet may contribute to decreased levels of cancer protective metabolites
- Metabolism of alcohol → responsible for ~3.6% of all cancers
- Short chain fatty acids may play a role in protection from colon and liver cancer
- Modulate activity of lignans
- Anti-inflammatory compounds

Other Benefits



- **Polyphenols**

- A healthy gut will take dark chocolate and ferment it into anti-inflammatory compounds that are good for the heart.
- Good bacteria such as Bifidobacterium and lactic acid bacteria are largely responsible for this fermentation.

- **Glucosinolates**

- Bacteria in the gut help transform the glucosinolates into the isothiocyanates.

Gut Microbiota and Cancer Treatment



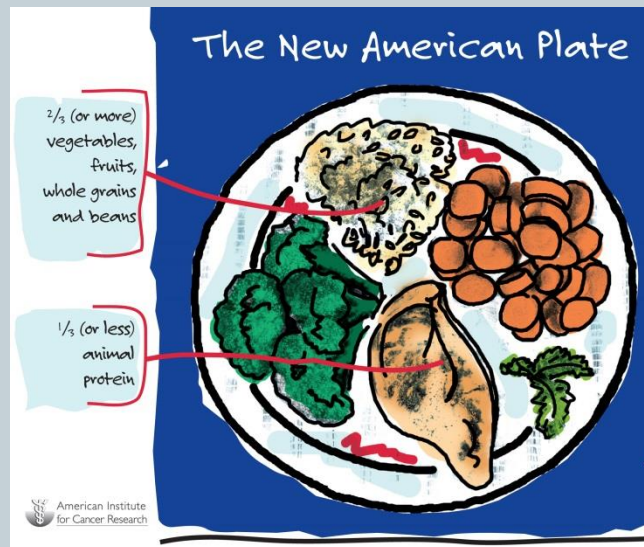
- During chemotherapy
 - Cyclophosphamide
 - 5-FU
 - Irinotecan
- Possible protection against myelosuppression and immunosuppression
- Pelvic irradiation

Viaud et al. *Science* , 2013
Osterlund et al. *Br J Cancer*, 2007
Salva et al. *Int Immunopharmacol*, 2014

Practical Tips



- Follow the AICR guidelines for diet and exercise
- Consider including probiotics or synbiotics in your regular diet
- Match the studied strain to the health condition



Helpful Resources



- NCCAM- <http://nccam.nih.gov/health/probiotics/introduction.htm>
- Human Food Project- <http://humanfoodproject.com/american-gut/>
- ISAPP- <http://www.isapp.net/>
- <http://www.gastro.org/patient-center/diet-medications/probiotics>
- http://www.worldgastroenterology.org/assets/export/userfiles/Probiotics_FINAL_20110116.pdf

Helpful Resources



- *Wild Fermentation: The Flavor, Nutrition, and Craft of Live-Culture Foods* (Chelsea Green Publishing 2003)
- *Making Sauerkraut and Pickled Vegetables at Home: Creative Recipes for Lactic Fermented Food to Improve Your Health* (Alive Books 2002)
- *Preserving Food without Freezing or Canning: Traditional Techniques Using Salt, Oil, Sugar, Alcohol, Vinegar, Drying, Cold Storage, and Lactic Fermentation* (Chelsea Green Publishing 2003)

Human Food Project

Do you want to know
which microbes live in your...



1 Donate!

Who's in my gut! Microbes for Two!



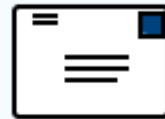
2 We'll mail you
your kit(s) and easy to
follow instructions!



3 Take samples from
yourself!
Or your dog!



4 Mail your samples
back to us!



? Does diet matter?



5 We'll do the
sequencing
and analysis!



6 See how you
compare to
everyone else!

