Fermented Foods and our Health
Betzy Bancroft, RH 2012

## Overview of anatomy & physiology

Our GI tract is a long tube from our mouth down where our food is broken down with the help of teeth, salivary enzymes, stomach acid, pancreatic and other enzymes, and bile from the liver. When food is well digested, it can be assimilated through the small intestine into the portal circulation and on to the liver. The liver detoxifies chemicals and is a great recycling center for many substances our bodies depend on. Finally we excrete the waste, hopefully regularly. This assembly-line-like procedure is controlled by the endocrine and nervous systems, but also depends on many co-habitating microflora for its function and the well being of its structures, particularly the colon.

Because we ingest so many potentially pathogenic organisms and chemicals with our food, there is a vast amount of immuno-active tissue (GALT-gut associated lymphoid tissue) and immune cells (immunoglobulins, white blood cells) within the GI tract, literally stationed there to protect us from food-borne invaders. As we shall see, our microflora are also an important part of this defense.

## What are gut flora?

There are more than 500 different bacterial species, primarily of the genera Bacteroides, Bifidobacterium, Fusobacterium, Eubacterium, Clostridium, Peptococcus, Peptostreptococcus and Ruminococcus, Escherichia, Enterobacter, Klebsiella, Lactobacillus and Proteus. Most are anaerobic, but some are aerobic or facultative (both). One big factor in inconclusive data from studies done on human intestinal flora is the lack of sufficient means of analyzing, identifying and classifying these genera and species. A common method has been isolation and culturation, but many of these bacteria cannot be cultured in vitro. Science has recently been employing more modern genetic and chromatographic techniques to the analyzation of GIT organisms with significantly more precision. There is still much to learn.

The total number of these organisms is huge, estimated at 10 times more volume of flora than our own cells! The incredibly complex diversity and interaction of these organisms is also important to their functions. Microbiological colonization of the body begins at birth, and each of us develops a unique ecosystem by the time we are about 2 years old.

Our microbes are mostly bacteria, but there are also fungal residents that are held in balance by the greater population of Lactobacillus particularly. When there is a change in environment, there can be changes of microbial population that make it easier for some organisms to morph into more pathogenic strains and infect us. This can happen with Candida species and E. coli. Thus it is the diversity and balance of our microbial ecology that keeps us well and strong.

## How do gut flora contribute to our digestive function?

Our gut flora makes a range of B vitamins that are important for our nervous system and production of blood. They also help produce vitamin K1 which is necessary for our blood's ability to clot.

Colonic bacteria break down parts of food, like fiber, that our stomachs can't digest. They specifically break fiber down into amino acids and short chain fatty acids that are directly important as food to the cells of the intestines. The cells lining our intestines get a lot of wear and tear from processing so much food (60 tons in an average lifespan!), so they turn over quickly.

This makes them hungry, so they are especially dependant on fiber in the diet and the gut flora to keep them fed with SCFA.

Many GI bacteria adhere directly to the inside surface of the intestine, particularly the large intestine. This also helps protect these cells from damage or contact with pathogens.

They help us eliminate bile, the fluid from the liver, efficiently.

They help us with mucus secretion in the bowel, which also helps protect it.

They help us maintain our bowel rhythm.

How do gut flora contribute to our immune function?

Our microflora helps our immune system learn appropriate reactions to substances – our immune system learns by remembering, much like our nervous system.

The population and diversity of beneficial organisms keep pathogens from getting a hold in our guts – out of receptors, away from the cells of the intestines, and maintain the right kind of environment so that normal residents don't become pathogenic.

Healthy gut flora also prevents inflammation by maintaining good tissue integrity of the GI tract cells.

They directly inhibit diarrhea-causing bacteria.

What harms our gut flora?

Bad diet – especially excessive refined carbohydrates and high animal protein

Antibiotics can have a long-lasting effect on our microflora

Stress can change our internal biochemistry, and increased stress hormones in the GI tract can cause sloughing of bacteria that were normally attached to the colonic mucosa.

Being too clean prevents us from having an abundant, diverse population

Inflammation, depressed immunity and parasite infection can be vicious cycles perpetuating one another

High consumption of coffee and alcohol

What are the symptoms of dysbiosis?

Allergies – including food allergies but also skin rash symptoms. These kinds of problems can stem from leaky gut – or poor tissue integrity of the colon.

Frequent gas and bloating, smelly gas, indigestion

Frequent or recurrent vaginal infections

Thrush and other fungal infections

Diarrhea and/or constipation

Systemic reactions after eating (rashes, etc.)

Rectal itching

Chronic intestinal infection

Undigested food in stool

Fatigue

Weak or cracked fingernails

Dilated capillaries in cheeks & nose in non-alchoholic person

Post adolescent acne, other skin conditions including rosacea

Iron deficiency

Skin easily bruised

Diseases that can stem from chronic dysbiosis:

Cancer – especially colon and breast
Irritable Bowel Syndrome and Inflammatory Bowel Disease
Rheumatoid Arthritis, Ankylosing spondylitis
Type II Diabetes
Allergies
Resistant infections, GI infections
Cardiovascular problems

One of the key issues here is that dysbiosis can maintain a chronic state of low-grade inflammation in the intestines that increases reactivity of the immune system and creates inflammation elsewhere in the body. Science is finding that inflammation is one of the roots of chronic degenerative disease.

How can I rebuild by gut flora?

First thing is to improve one's diet if it's not already good. We should all eat primarily whole foods, that is fresh and unprocessed as possible. That way we get plenty of nutrients as well as fiber. Vegetables, fruits, whole grains, legumes, nuts, seeds and pastured animal products in moderation are all whole foods. Read labels and go for minimal ingredients and packaging, that is apples or rice instead of pudding or bread.

Improve digestive function with herbs. Bitter herbs like dandelion root increase our secretions and spices like fennel seed help relax our GI tract and improve motility. Demulcent herbs like marshmallow help soften our stools and regulate our motility.

Include cultured and fermented foods in the diet daily. Best to eat some with each meal, but also first courses and snacks are helpful to speed bacteria's passage to the intestines while stomach acid is lower. Drink water with one's fermented snack, also to help the bacteria reach the intestines quickly.

How to make ferment!

Here comes the fun part . . . the basic method for lacto-fermented vegetables is:

1. shred the vegetables by hand, with a box grater or food processor
2. mix the vegetable shreds with salt (3 Tablespoons per 5 lb or 1-2 teaspoons per quart) in a large bowl. Add any other spices you'd like (ginger, caraway, juniper)
3. pack the vegetables into a wide-mouth jar or crock, pressing them down firmly as you go; best to do this a little at a time so they get well-tamped down
4. as the vegetables are mashed into the jar, they will release liquid that starts to rise around them. As you pack the last veggies in, the liquid level should be above the vegetable level. If the fluid level doesn't come up high enough after a day, you can add a brine solution until the veggies are beneath the fluid level. This is important since the lactobacillus are anaerobic bacteria.
5. cover the vegetables with a clean plate or another jar that fits into the neck of the wide mouth jar. You can press down on this fairly often when you first pack the jar to help the liquid rise.
6. cover the container with a towel and keep an eye on your ferment – will be done within a few days or a week!
7. to preserve your ferment, take the plate or smaller jar off, cap the jar and keep in the fridge. press the vegetables back down under the brine each time you take a serving.