Care And Feeding Of The Intestinal Microbiome

Q. What is the intestinal microbiome?

A. The intestinal tract is made up of a large collection of microorganisms. Collectively, these bacteria, yeasts, viruses and fungi are known as the intestinal microbiome.

Q. How many microbes live in the intestinal tract?

A. Your intestines are home to an estimated 100 trillion microbes. There are at least 4,000 different known species of microbes in the intestinal tract. The vast majority of these microbes reside in the large intestine.

Q. What are some of the beneficial effects that microbes have on the body?

A. Microbes carry out numerous essential functions to help maintain health and well-being. These functions include the following:

- Protection against the invasion of toxic bacteria and viruses
- Digest and absorb nutrients
- Educate the intestinal immune system
- Protect the intestinal mucus barrier and the permeability of the spaces between intestinal cells
- Act as a source of energy for intestinal cells
- Synthesize essential vitamins
- Activate and deactivate medication introduced into the body
- Help protect against the development of cancers

Q. Do the microbes in the intestinal tract change?

A. Each person's microbiome is unique and is always changing. For example, the microbial composition in the intestinal tract in the morning may be different from the one present later in the day. Multiple factors can affect the number and diversity of the microbe population, including the following:

- Acid reducing medications
- Advancing age
- Alcohol
- Antibiotics
- Constipation
- Chemotherapy
- Diet
- Food additives
- Food coloring
- Food preservatives
- Food toxins
- Hygiene
- Intestinal infections
- Intestinal surgery
- Lack of exercise
- Liver disease
- Pain medications
- Poor sleep habits
- Radiation therapy
- Recreational drugs
- Stress
- Tobacco

PROBIOTICS

Q. What are probiotics?

A. Probiotics are microorganisms that can be added to the intestinal tract that may aid in digestion and assist in other essential functions.

Q. What foods contain probiotics?

A. Any food that is cultured or fermented is considered a probiotic. Examples of food products that are considered probiotics include the following:

- Kefir milk
- Yogurt
- Aged cheeses such as Cheddar, Gouda, and Parmesan
- Sauerkraut, Kimchi and other pickled versions of vegetables
- Miso (fermented barley, soy or rice)
- Green pickles in brine
- Tempeh (fermented soy)
- Kombucha (fermented tea)

Q. What factors influence the survival of probiotic supplements once they enter the intestinal tract?

A. Survival of a probiotic may be based on a number of factors including:

- Interaction with highly concentrated stomach acid
- Interaction with bile
- Interaction with pancreatic digestive enzymes
- Rapidity with which food and probiotics leave the stomach
- Time of day and relationship of taking the probiotic with ingestion of other foods and beverages
- Contact with prescription antibiotics taken at the same time as the probiotic
- Contact with antibiotic-like chemicals that are naturally produced by cells in the intestinal tract
- Temperature of the fluid that the probiotic is mixed with (if the probiotic is a powder)

Q. Should I be concerned about when I take a probiotic?

A. Probiotics should be taken on an empty stomach. They should be taken separate from any over-the-counter medications or supplements and separate from any prescription medications by 4 hours. Probiotics should be taken at approximately the same time each day.

Q. How can I prevent stomach acid from destroying the potency of a probiotic?

A. Ideally, stomach acid should be neutralized or reduced before taking a probiotic. Although probiotic manufacturers may advertise that their probiotic contains an acid resistant coating, the validity of the claim is rarely tested and should not be relied upon.

One method of reducing or eliminating acid would be to take an antacid tablet such as calcium carbonate (TUMs® or Rolaids®) 20

to 30 minutes before taking a probiotic. Individuals who take proton pump inhibitors to reduce stomach acid such as Prilosec®, Nexium®, Protonix®, Prevacid®, and Dexilant® do not have to use any other method of acid neutralization before taking a probiotic.

Q. Should probiotic supplements be kept refrigerated?

A. Although the instructions on the packaging of the probiotic may not call for refrigeration, probiotics are living microorganisms and, therefore, have a shelf life that may be prolonged by refrigerating them.

Q. Are there any side effects associated with taking probiotics?

A. Some individuals experience abdominal bloating, distention, excess gas formation, cramps, nausea, or change in consistency and frequency of bowel actions during the first few weeks after initiating a probiotic. Reducing the dose of the probiotic may help during the initial period of adjustment.

Q. Are there any other factors to consider when trying to select a probiotic?

A. The following factors should be considered when trying to select a probiotic:

- Give preference to probiotics that are manufactured in the United States.
- Try to find a probiotic supplement that has been tested and reported to be effective.
- Give preference to purchasing probiotics that have multiple different strains of organisms rather than just one strain.
- Give preference to those probiotics that have the highest numbers of organisms in each dose. Note that manufacturers only report the number of organism present at the time the probiotic is manufactured and not at the end of the probiotic shelf-life. Therefore, select probiotics with the longest expiration date. The later the date of expiration—the better.

- Do not buy more than a 30 day supply of a probiotic at any one time.
- Do not mix probiotic powders in carbonated beverages, alcoholic beverages, or very hot liquids.
- If using probiotics on a long-term basis, consider rotating the brands in order to introduce different strains of organisms.

PREBIOTICS

Q. What are prebiotics?

A. Prebiotics are dietary substances, usually non-digestible carbohydrates, that can reach the large intestine where they feed, nourish and stimulate the growth and activity of bacteria. These non-digestible carbohydrates are commonly referred to as "dietary fiber".

Q. Are all high-fiber foods considered prebiotics?

A. Not all high-fiber foods can be fermented by microbes in the large intestine. These fiber products are known as "insoluble fiber" and can be found in food products like wheat bran and whole wheat bread.

Q. How much dietary fiber should be included in the diet each day?

A. There is no dietary reference that sets the exact amount of soluble and insoluble fiber to include in the diet. Many nutritionists recommend a total dietary intake of 25-35 grams of fiber per day with about one-quarter of the intake (6-8 grams) coming from soluble fiber.

Q. How do prebiotics work?

A. Prebiotics escape digestion in the small intestine and make their way into the large bowel where they are slowly fermented and broken down by the resident bacteria.

Through a process called fermentation, chemicals known as short chain fatty acids are produced. These chemical compounds feed gut bacteria, fuel the colon cells, help prevent the growth of disease producing bacteria, and fortify the intestinal lining as well as help regulate immune function. Probiotics are like stocking your pond--prebiotics are like feeding the fish.

Q. Are there any side effects associated with ingestion of prebiotic food substances?

A. Abdominal bloating, distention, gas formation, cramps, nausea, or change in consistency and frequency of bowel movements may occur as prebiotics are introduced into the diet. It is, therefore, important to increase the intake of prebiotic food substances slowly over a period of weeks to allow gut bacteria to adjust.

Q. What are some foods that are considered prebiotics?

A. Common food items that are prebiotics include the following:

- Apples
- Asparagus
- Baked beans
- Bananas (not fully ripe)
- Cashews
- Cocoa
- Dried figs
- Garlic
- Green peas
- Ground flaxseed
- Leeks
- Wheat bran
- Barley
- Jicama Root
- Lentils
- Nectarines
- Oats
- Onions
- Persimmons
- Prunes
- Red kidney beans
- Snow peas
- Soybeans
- Yams

Q. Are there any non-food supplements that can be used as prebiotics?

A. Supplements that contain the chemicals inulin and fructooligosaccharides can be taken orally as a prebiotic. A powdered form of inulin combined with fructooligosaccharies can

be found in Jarrow Formulas Inulin-FOS®. The usual dose is one scoop of the powder in a beverage of choice. This product can be purchased at health food stores or on the Internet.

Another non-food soluble fiber supplement comes in the form of a gum drop and is marketed under the name of Phillips Fiber Gummies®. Two fiber gummies contain 4 grams of soluble fiber. The gum drops are fruit flavored. Two of the fiber gummies can be taken twice daily. Phillips Fiber Gummies® can be purchased at most drugstores.

Note that Phillips Fiber Gummies® also come in a formulation that is marketed as ***Phillips Fiber Good with Energy Support Gummies.®*** This product should be avoided since it contains niacin which can cause bothersome side effects in many individuals.

Q. Are there other supplements that should be taken when taking prebiotics and probiotics?

A. The biochemical events that occur during fermentation and production of short chain fatty acids by the resident bacteria also rely on specific vitamins and minerals that act as cofactors including: Vitamin A, Vitamin D, Vitamin B-12, and Zinc.

Q. Can prebiotics and probiotics serve as a substitute for conventional therapy?

A. The use of prebiotics and probiotics is not a substitute for conventional therapy but should be thought of as complementary to other treatments.

There is mounting evidence from basic and clinical research that the use of diet, prebiotics, and probiotics may be able to alter the risk and the course of various illnesses. Further well-designed and controlled studies, however, are still needed to validate this research.