

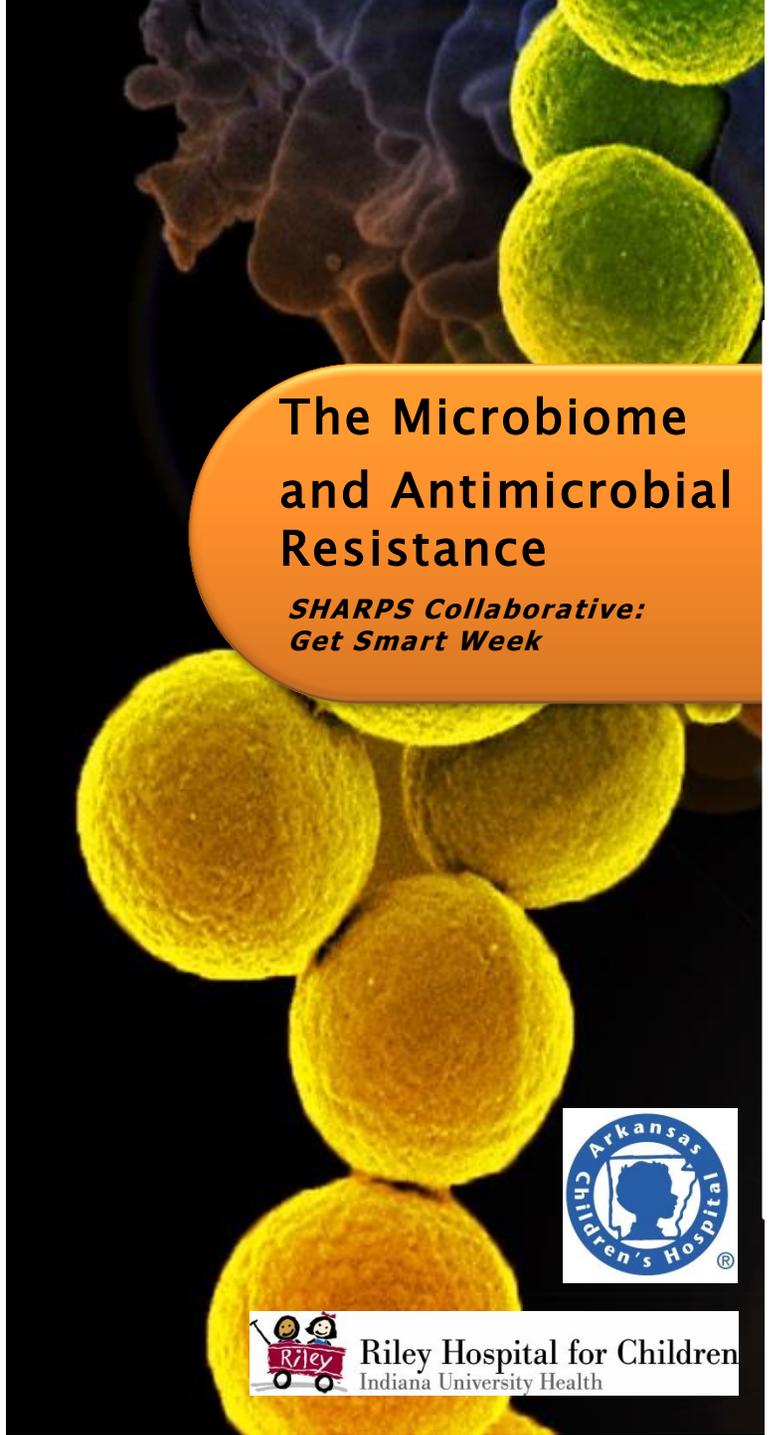
What are some activities you can participate in that will promote a healthy microbiome?

1. Eat yogurt on Tuesday, Nov. 18. Yogurt contains *Lactobacillus*, an important component of your intestinal microbiota.
2. Consume fruits, nuts, and vegetables instead of processed carbohydrates. Simple carbohydrates promote overgrowth of organisms that are linked to obesity, diabetes, and inflammatory disorders⁵, whereas fiber, foods high in antioxidants, and whole grains are thought to counteract this.
3. Avoid taking or prescribing antibiotics unless necessary for treatment of a bacterial infection. Many common illnesses such as colds are caused by viruses, which do not respond to antibiotics.
4. For Thanksgiving this year, consider eating a turkey that was raised without antibiotics. This helps to support farmers who don't mis-use antibiotics. Antibiotic over-use in farm animals may contribute to the spread of resistant organisms in humans.
5. Avoid hand soaps that contain antibiotics; these can contribute to the development of resistance among organisms on our skin.

SHARPS Collaborative: Children's Mercy Hospital & Clinics, Children's Hospital of Philadelphia, Cincinnati Children's Hospital, Lurie Children's Hospital of Chicago, Children's Hospital of Omaha, Primary Children's Medical Center, Seattle Children's Hospital, All Children's Hospital, Arkansas Children's Hospital, Boston Children's Hospital, Children's National Medical Center, Children's Hospital Colorado, Helen DeVos Children's Hospital, Miami Children's Hospital, Riley Hospital for Children at IU Health, Rady Children's Hospital, Texas Children's Hospital, Lucille Packard Children's Hospital, Nationwide Children's Hospital, Children's Hospital Los Angeles, Doernbecher Children's Hospital, Connecticut Children's Medical Center, Driscoll Children's Hospital, Children's of Alabama, Children's Hospitals and Clinics of Minnesota, Stony Brook Children's Hospital, Children's Hospital Association

References:

1. Human Microbiome Project Consortium. Structure, function and diversity of the healthy human microbiome. *Nature* 2012;486(7402):207-14.
2. Fierer N, Hamady M, Lauber CL, Knight R. The influence of sex, handedness, and washing on the diversity of hand surface bacteria. *Proc Natl Acad Sci U S A* 2008;105(46):17994-9.
3. Inside central image adapted from: http://en.wikipedia.org/wiki/Microbiome#mediaviewer/File:Skin_Microbiome20169-300.jpg
4. Azad MB, Bridgman SL, Becker AB, Kozyrskyj AL. Infant antibiotic exposure and the development of childhood overweight and central adiposity. *Int J Obes* 2014;38(10):1290-8.
5. Lopez-Legarrea P, Fuller NR, Zulet MA, et al. The influence of Mediterranean, carbohydrate and high protein diets on gut microbiota composition in the treatment of obesity and associated inflammatory state. *Asia Pac J Clin Nutr* 2014;23(3):360-8.
6. Background image from the Public Health Image Library (CDC/ National Institute of Allergies and Infectious Diseases). Available at: <http://phil.cdc.gov/phil/details.asp> image # 18128.



The Microbiome and Antimicrobial Resistance

**SHARPS Collaborative:
Get Smart Week**



Riley Hospital for Children
Indiana University Health

WHAT IS THE MICROBIOME/MICROBIOTA

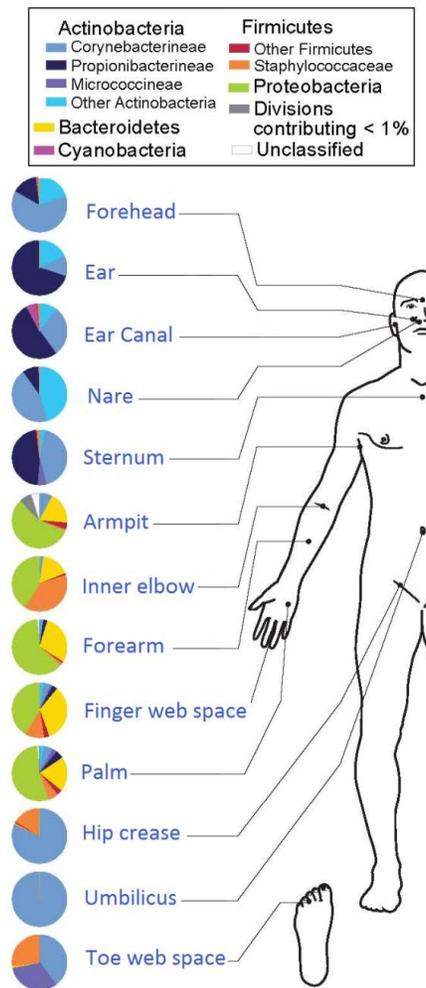
The microbiota is the vast array of bacteria, viruses, and fungi that live in and on our bodies. These organisms outnumber our own cells by 10 to 1, though they are much smaller in size. The microbiome is the genetic information which provides the blueprints and instructions for these organisms. The terms microbiome and microbiota are generally interchangeable. Researchers have calculated that there are some 10,000 species in the human microbiome, 81-99% of which have already been identified¹.

The organisms isolated display great variety both between humans as well as within places on our own bodies. For example, bacteria isolated on one's left hand may be completely distinct from the bacteria found growing on the right hand².

WHY DO WE NEED MICROBES

There are many beneficial actions attributed to the bacteria and fungi which colonize our skin, airways, and digestive tract. By simple action of growing and multiplying, they compete for space with pathogenic organisms that might cause us harm.

The figure below illustrates the diversity of microbes on various parts of the skin³.



Bacteria within our digestive tract also help to break down complex nutrients and are important in recycling chemicals that we convert into vitamins.

WHAT EFFECTS DO ANTIBIOTICS HAVE ON OUR MICROBIOTA

Broad spectrum antibiotics are known to wipe out large sectors of the intestinal microbiota, which disrupts the ecology of the organisms that normally keep us healthy. This causes diarrhea and clears the way for pathogens such as *Clostridium difficile*.

Replacing the normal flora is difficult but new research shows that it may be of benefit in patients with recurring *C. difficile* infections.

Children are not immune to the side-effects of these drugs; antibiotic exposure in infants is now linked to higher rates of weight gain and obesity early in childhood⁴.

Antibiotic resistance is another area of concern on a national scale. When we take antibiotics, some organisms will survive and continue to reproduce due to antibiotic resistance. Once we are colonized, antibiotic-resistant organisms can be extraordinarily difficult to eradicate from the skin or gastrointestinal tract. This can have long-term health consequences such as recurrent infections and the spread of resistant microbes to family members.