Bacteria Effect on Health and Human-Review

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Abstract

Microbes are an important component of the microbiology eco-system in the human gut, which is colonized by 10^{14} bacteria , ten times more than the human cells. Gut bacteria take an important role in human health, like supplying essential nutrients, synthesizing vit. K, aiding in the digestion of cellulose, and promoting angiogenesis and enteric nerve function. However, they can also be potentially harmful due to the change of their composition when the gut ecosystem undergoes abnormal changes in the light of the use of antibiotics, illness, stress, aging, bad dietary habits, and lifestyle. Dysbiosis of the gut bacteria communities can cause many chronic diseases, such as inflammatory bowel disease, obesity, cancer, and autism.

Keywords : Many , Chron, Life.

1.Introduction

The body of bacteria involves more bacterial cells than human cells. Bacteria are actually essential to your overall health. Of course, not all bacteria have a good reputation. The Centers for Disease Control and Prevention estimate that 48 million people get sick yearly from bad bacteria found in food.

Let’s start with the good news first. You need bacteria to live. Everything you eat passes through your gastrointestinal system. This is important because your colon is lined with millions of bacteria that grow, live and metabolize to help prevent disease. These bacteria fight foreign substances, help prevent the growth of harmful bacteria, maintain your mucosal immune system, help lower serum cholesterol levels and regulate metabolism. You might have heard of gut flora before. Gut flora, which are the live microorganisms in your intestines, are beneficial to your health. For example, bifidobacteria are intestinal bacteria found in the gut that can aid in treatment of diarrhea, ulcerative colitis, atopic eczema, yeast infections and irritable bowel syndrome.

2.Importance of Diet on Good Bacteria

The food you decide to eat affects the life of the good bacteria found in your gut. A diet high in fat can disturb your GI barrier. The GI barrier is the bacteria’s local defense system. Any disturbance of the GI barrier increases your risk of infection, inflammation and disease. On the other hand, a diet consisting of complex carbohydrates supports the GI barrier and health of the good bacteria. Good sources of complex carbohydrates include fruits, vegetables, cereals and legumes.

3.Bad Bacteria's Effects on Health

The ultimate effect of bad bacteria on your health is death. The CDC estimates that 3,000 die yearly due to foodborne illnesses including deaths caused by bad bacteria. Out of the 48 million that do contract a foodborne illness, 128,000 end up in the hospital. Escherichia coli, also known as E. coli, can be both good and bad. While E.coli does live in your intestines, it is also found in the intestines of animals and the food you eat. However, some strands of E. coli can be pathogenic, leading to diarrhea, respiratory illness, urinary tract infection and other illnesses. Salmonella, Clostridium perfringens, listeria monocytogenes and staphyloccus aureus are bacteria associated with the leading causes of illness, hospitalization and death in America.

4.Reducing Effects of Bad Bacteria

Diet and food safety are crucial to reducing your risk of experiencing the harmful effects of bad bacteria. Since good bacteria aid in helping fight and eliminate bad bacteria in the gut, start by following a diet to support gut health. Harmful bacteria use protein and fat to produce toxins which are commonly found in red meats. One of the simplest actions you can do to prevent the bad effects of bacteria is to clean. Clean everything! Start by cleaning your hands, then clean surfaces, utensils and cutting boards. Wash fruits and vegetables before you start cutting or peeling. The next step is to separate. Separate raw produce from raw meat, fish, eggs and poultry. Cook all food thoroughly, using a food thermometer if necessary. Lastly, since bacteria can grow in many foods within two hours of being cooked, refrigerate food as soon as possible.

Martin Blaser of New York University has been working to identify the various bacteria that live on the human skin and help to form a protective barrier on the outside. Before he started his research it was estimated that fewer than 100 different species of bacteria lived on the skin. Using relatively new DNA-based sequencing techniques, he and his colleagues attempted to identify the bacterial species on the forearms of healthy subjects.

An initial study of six subjects identified 182 bacterial species. Subsequent studies continued to add more species to the point where Blaser now estimates the number of different bacteria species living on the skin could approach 500.

Despite these numbers Blaser notes that only about 10 species predominate, accounting for approximately 50% of the total population.

"What was interesting about some of the other species with smaller populations is that they were host specific. We could only identify them on a single host. It is entirely possible that everyone could have a unique bacterial signature," says Blaser, much in the same way eveyone has a unique DNA signature or a unique fingerprint.

Blaser is also beginning to explore the role these may play in skin disease and that research may be paying off. Initial studies of patients with psoriasis suggest differences in skin bacterial populations between patients who have the disease and those who do not.

Daniel Frank of the University of Colorado, Boulder, is part of a team that is exploring the role bacterial communities in the human digestive tract may play in inflammatory bowel diseases. They are collecting and comparing microbial communities in samples from people with Crohn's disease, people with ulcerative colitis and healthy volunteers.

"Some researchers are looking at the role a specific organism, like E. coli, might play in the development of inflammatory bowel disease. Our task was to look more broadly. What are the microbes we see as a whole in the gut and how might those populations change in relation to disease"" says Frank.

Instead of any one particular organism associated with inflammatory bowel diseases, they observed significant shifts in microbial populations between healthy subjects and those with disease, including a loss of normally protective bacterial populations.

The bacteria in the digestive tract could also play a role in obesity. Ruth Ley of Washington University in St. Louis is part of a team that has been investigating the relationship between bacteria in the gut and weight. Several years ago they discovered that obesity was associated with changes in the relative abundance of certain types of bacteria in the digestive tract.

Due to their overwhelming numbers, the fact that their byproducts can be found in most human fluids, and the evidence of their potential role in health and disease, it is quite possible that mapping and understanding the human microbiome may be as important or more important to understanding human health than mapping and understanding the human genome, says McFall Ngai. Either way, with the complexity of the system, it is definitely going to be more difficult.

Recognizing its importance, the National Institutes of Health in December 2007 announced the Human Microbiome Project as part of its Roadmap for Medical Research, devoting over $100 million in grants over the next five years. Researchers will use new, comprehensive laboratory technologies to characterize the microbial communities present in samples taken from healthy human volunteers, even for microbes that cannot be grown in the laboratory. The samples will be collected from five body regions known to be inhabited by microbial communities: the digestive tract, the mouth, the skin, the nose, and the female urogenital tract. Research projects will subsequently be funded to sample the microbiomes from volunteers with specific diseases. This will allow researchers to correlate the relationship between changes in a microbiome present at a particular body site to a specific illness.

5. Commensal Bacteria

Many bacteria live within our gastrointestinal tract, on our bodies or in the environment with which we come into daily contact without there being any resulting disease. In these situations, the bacteria are non-pathogenic and are called commensal bacteria, which means “eating at the same table.” It is recognized, however, that many of these organisms can cause infections such as wound infections or septicaemia if they are introduced into body tissues, particularly if the person is immune compromised . Although many genera and species of heterotrophic bacteria have been isolated from water and have been found to colonize distribution systems, no outbreaks of associated human disease have been conclusively reported. Suspicions have been raised about several organisms, such as Klebsiella spp. and Citrobacter spp., but their frequent isolation and lack of involvement in human gastrointestinal disease make them very unlikely candidates. There are concerns about the potential for Aeromonas spp. and Yersinia enterocolitica to cause diarrhoeal disease.

In Swedish water distribution systems, sampling demonstrated counts of up to 300 cfu/100 ml in raw water and up to 750 cfu/100 ml in tap water samples (Kuhn et al. 1997). The significance of Aeromonas in drinking-water is not fully understood. It is recognized that, on occasions, the ingestion of Aeromonas spp. may lead to diarrhoeal disease, and this is associated with an enterotoxin (Janda and Duffey 1988). There are numerous reports of Aeromonas isolates from patients with diarrhoea, but also reports of Aeromonas strains that produce a heat-labile cytotoxin, have enterotoxin activity (Ljungh et al. 1977; Turnbull et al. 1984) and possess other pathogenic characteristics. It is suggested that when all are present in a strain, enteric infection may result. Human volunteer challenge trials using five enteropathogenic strains of Aeromonas hydrophila demonstrated diarrhoea in only 2 of 57 persons with administered doses ranging from 104 to 105 cfu (Morgan et al. 1985). A number of factors, such as age, immunocompetence, previously developed immunity, exposure and infective doses of the organisms, as well as the possession of virulence factors, could affect the ability of Aeromonas to establish overt infection. In the United Kingdom study of infectious intestinal disease in England, the percentage isolation rates were the same in diarrhoeal cases and in matched controls (Food Standards Agency 2000). The absence of defined outbreaks and the low levels of infectivity in human volunteer experiments suggest that people have a relatively high degree of resistance to infection with Aeromonas. The significance of Aeromonas in drinking-water in the Netherlands has been reviewed (van der Kooij 1988), and the health authorities in the Netherlands have defined maximum values for Aeromonas present in drinking-water: i.e., 200 cfu/100 ml in water distribution systems and 20 cfu/100 ml in water leaving the production plant. However, there have not been any outbreaks of disease in the United Kingdom, even though blooms of Aeromonas occur in some distribution systems during the summer months.

References

1- American Society for Microbiology. "Humans Have Ten Times More Bacteria Than Human Cells: How Do Microbial Communities Affect Human Health?." ScienceDaily. ScienceDaily, 5 June 2008., www.sciencedaily.com /releases/2008/ 06/ 080603085914.htm.

2- Janda, J.M. and Duffey, P.S. (1988) Mesophilic aeromonads in human disease: current taxonomy, laboratory identification and infectious disease spectrum. Rev. Infect. Dis. 10(5), 980–997.

3- Jewell, J.A., Warren, R.E. and Buttery, R.B (1993) Foodborne shigellosis. Commun. Dis. Rep. 3, R42–R44.

4- Kaper, J.B., Lockman, H., Colwell, R.R. and Joseph, S.W. (1981) Aeromonas hydrophila: ecology and toxigenicity of isolates from an estuary. J. Appl. Bacteriol. 50(2), 359–377.

5- Krovacek, K., Pasquale, V., Balcola, S.B., Sopraro, V., Conte, M. and Dumontet, S. (1994) Comparison of putative virulence factors in Aeromonas hydrophila strains isolated from the marine environment and human diarrhoeal cases in southern Italy. Appl. Environ. Microbiol. 60(4), 1379–1382.

6- Kuhn, I., Allestam, G., Huys, G., Janssen, P., Kersters, K., Krovacek, K. and Stenstrom, T.A. (1997) Diversity, persistence, and virulence of Aeromonas strains isolated from drinking water distribution systems in Sweden. Appl. Environ. Microbiol. 63(7), 2708–2715.

7- Lassen, J. (1972) Yersinia enterocolitica in drinking water. Scand. J. Infect. Dis. 4, 125– 127.

8- Lightfoot, N., Pearce, M., Place, B. and Salgado, C. (2001) Molecular techniques for the detection of bacterial pathogens in drinking water. In Rapid Detection Assays for Food and Water, pp. 59–65, Royal Society of Chemistry, Cambridge.

9- Ljungh, A., Popoff, M. and Wadstrom, T. (1977) Aeromonas hydrophila in acute diarrhoeal disease: detection of enterotoxin and biotyping of strains. J. Clin. Microbiol. 6(2), 96–100.

10- Lye, D.J. and Dufour, A.P. (1991) A membrane filter procedure for assaying cytotoxic activity in heterotrophic bacteria isolated from drinking water. J. Appl. Bacteriol. 70, 89–94.

11- Mermin, J.H., Villar, R., Carpenter, J., Roverts, L., Samaridden, A., Gasanova, L., Lomakina, S., Bapp, C., Hutwagner, L., Mead, P., Ross, B. and Mintz, E.D. (1999) A massive epidemic of multi drug-resistant typhoid fever in Tajikistan associated with consumption of municipal water. J. Infect. Dis. 179(6), 1416–1422.

12- Millership, S.E. and Chattopadhyay, B. (1985) Aeromonas hydrophila in chlorinated water supplies. J. Hosp. Infect. 6, 75–80.

13- Morgan, D.R., Johnson, P.C., DuPont, H.L., Satterwhite, T.K. and Wood, L.V. (1985) Lack of correlation between known virulence properties of Aeromonas hydrophila and enteropathogenicity for humans. Infect. Immun. 50, 62–65.

14- Moyer, N.P., Luccini, G.M., Holcomb, L.A., Hall, N.H. and Altwegg, M. (1992) Application of ribotyping for differentiating aeromonads isolated from clinical and environmental sources. Appl. Environ. Microbiol. 58, 1940–1944.