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**UNIVERSITY OF MARYLAND SCHOOL OF MEDICINE STUDY FINDS
VAGINAL MICROBES VARY OVER TIME AMONG HEALTHY WOMEN**
Scientists Hope Research is Starting Point for Personalized Medicine for Women

Baltimore, Md. — May 2, 2012. The delicate balance of microbes in the vagina can change drastically over short periods of time in some women, while remaining the same in others, according to a new study led by the University of Maryland School of Medicine's Institute for Genome Sciences and the University of Idaho. The scientists believe that these microbes affect a woman's susceptibility to infection and other diseases, so such changes might also mean that the risk of infection varies over time. Researchers hope further study will lead to personalized medicine for women, allowing doctors to tailor each woman's treatment and health maintenance strategies to her individual microbial make-up. The study was published online May 2, 2012, in the journal *Science Translational Medicine*.

Researchers used advanced genomics and bioinformatics technology to analyze the vaginal microbes found in 32 women over time. The work was a collaboration led by Jacques Ravel, Ph.D., associate professor of microbiology and immunology and associate director of the Institute for Genome Sciences at the University of Maryland School of Medicine, and Larry Forney, Ph.D., a professor in Biological Sciences and director of the Institute for Bioinformatics and Evolutionary Studies at the University of Idaho. The research marks the first time genomics technologies have been used to examine vaginal microbial communities over time.

The study is an example of an emerging field of genomics, the study of the human microbiome. The human microbiome refers to all of the microbes that live on and in the human body. Scientists believe these tiny organisms interact closely with the human genome and play a critical role in human health and disease. In the vagina, these communities of microbes play a critical role in maintaining and promoting a woman's health and in protecting her against disease. Vaginal

microbes provide protection mainly by producing lactic acid to create an acidic environment that is hostile to certain harmful microbes or infection.

“This cutting edge basic research is revolutionizing the way that we practice medicine, forming the foundation of the emerging field of personalized medicine,” says E. Albert Reece, M.D., Ph.D., M.B.A., vice president for medical affairs of the University of Maryland and John Z. and Akiko K. Bowers Distinguished Professor and dean, University of Maryland School of Medicine.

“Personalized medicine truly is the future of patient care, allowing us to tailor care to each patient’s individual needs. Our Institute for Genome Sciences is a world leader in advancing this new field, and this research is a great example of their groundbreaking work.”

In a previous large-scale study, the researchers found five main groups of microbial communities among women, and that the proportion of women in each community varied by ethnicity. They also found that microbial communities that may not offer women optimal protection were more common among Hispanic and black women than they were in Asian and white women.

“Those data highlighted potential ethnic disparities and a need for more personalized medicine,” says Dr. Ravel. “The present study builds upon those results. It shows that the types and quantity of microbes found in the vagina can vary slightly or even markedly over short periods of time in some women, while other women show no change. These changes can coincide with a woman’s menstrual period, but often do not. The kinds of changes vary between women and seem highly individualized. Most studies or treatments traditionally are based upon the idea that all women are the same and will react similarly to treatments. But our research shows that each woman seems to have her own ‘healthy’ state.”

“Our findings pave the way for organizing women into groups based upon the type of microbes they have in the vagina over time,” adds Dr. Forney. “Each group could receive personalized therapies tailored to the make-up of their vaginal microbial community.”

The results could change the way that women are diagnosed and treated, says Dr. Ravel. Women are usually evaluated based upon one sample taken at a single point in time, but this could be

misleading since the research shows that the vaginal microbiome could change over time. The researchers hope that an increased understanding that the vaginal microbiome varies between women and changes over time can reduce misdiagnosis of conditions such as bacterial vaginosis, and unnecessary prescription of broad-spectrum antibiotics to treat the condition. The scientists' work over the past few years has shown that even microbes that were previously believed to be detrimental to a woman's health seem to be part of a normal ecosystem in someone women. The researchers will continue to examine the function of these microbes and the communities in which they appear. Dr. Ravel says that he does not expect gynecologists will immediately overhaul their standard practices, but the research is an important starting point for future translational studies leading to improvement of women's health.

Yeast infections and bacterial vaginosis cause discomfort in patients and can have serious health effects. About 25 to 30 percent of women have bacterial vaginosis on any given day, and it is the most common reason why women of reproductive age visit their primary care physician. The condition has been associated with an increased risk of such problems as acquiring sexually transmitted infections and even pre-term birth. "If we could identify women as being at a high risk for developing bacterial vaginosis, we could develop preventive methods to lower the risk of adverse consequences," says Dr. Forney.

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