Bacteria and Immunity in the Cervix May be Key to Predicting Premature Birth

University of Maryland School of Medicine Research Sheds Light on Potential Predictors of Premature Birth

BALTIMORE, MD. , March 21 -- Spontaneous preterm birth (sPTB), defined as birth before 37 weeks of gestation, and the related complications are the largest contributors to infant death in the United States and worldwide. Researchers at the University of Maryland School of Medicine (UMSOM) have discovered that bacteria and innate immune factors in a woman's birth canal and cervix may increase the risk of spontaneous preterm birth or provide protection against such births.

Results of the study which was conducted in collaboration with the Perelman School of Medicine at the University of Pennsylvania, were published today in *Nature Communications*. This research provides groundbreaking information could help physicians better predict and prevent these preterm births. The study sets the path for new research to develop rational strategy that would target "bad" bacteria or increase "protective" bacteria.

The findings are key as babies who survive an early birth often face serious, costly and lifelong health problems, including breathing problems, vision loss, cerebral palsy and intellectual delays. The economic burden of preterm birth is staggering, with an estimated cost of $26 billion per year in the United States alone. A failure to predict and understand the causes of preterm birth have limited the development of effective interventions and therapeutics.

In this study, researchers examined vaginal swabs from a sample of 2,000 pregnant women taken at three distinct points in pregnancy to determine the bacteria that made up the cervicovaginal microbiota. This is the largest cohort of pregnant women in whom the cervicovaginal microbiota was studied. Using innovative Bayesian modeling of the cervicovaginal microbiota, seven bacteria were significantly associated with increased risk of sPTB, with a stronger effect in African American women. Interestingly, higher vaginal levels of the antimicrobial peptide β-defensin-2, a part of our innate immune system, lowered the risk of sPTB associated with cervicovaginal microbiota in an ethnicity-dependent manner.

"*Previous studies, including ours, were limited by low sample size, and in establishing this large cohort, we aim to identifying factors early in pregnancy that could be used to predict the risk to spontaneous preterm birth. Predicting prematurity has been a riddle that's troubled researchers and clinicians for years, but we are finally shedding light on a path toward offering treatment to women we can identify as being at risk*," said co-senior author **Jacques Ravel, PhD**, Professor of Microbiology and Immunology at the Institute for Genome Sciences (IGS) at the University of Maryland School of Medicine, and Director of Genomics at IGS. "*These new findings are the result of a multidisciplinary team of experts in obstetrics and microbiology, who came together and took a new approach to address this major problem in the United States and the world*"

These findings hold promise for diagnostics to accurately identify women at risk for sPTB early in pregnancy. Therapeutic strategies could include immune modulators and microbiome-based therapeutics to reduce this significant health burden.

Dr. Ravel collaborated with **Michal Elovitz, MD**, professor, Obstetrics & Gynecology at the Perelman School at the University of Pennsylvania.

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About the University of Maryland School of Medicine

Now in its third century, the University of Maryland School of Medicine was chartered in 1807 as the first public medical school in the United States. It continues today as one of the fastest growing, top-tier biomedical research enterprises in the world -- with 43 academic departments, centers, institutes, and programs; and a faculty of more than 3,000 physicians, scientists, and allied health professionals, including members of the National Academy of Medicine and the National Academy of Sciences, and a distinguished recipient of the Albert E. Lasker Award in Medical Research. With an operating budget of more than $1 billion, the School of Medicine works closely in partnership with the University of Maryland Medical Center and Medical System to provide research-intensive, academic and clinically based care for more than 1.2 million patients each year. The School has over 2,500 students, residents, and fellows, and more than $530 million in extramural funding, with most of its academic departments highly ranked among all medical schools in the nation in research funding. As one of the seven professional schools that make up the University of Maryland, Baltimore campus, the School of Medicine has a total workforce of nearly 7,000 individuals. The combined School and Medical System ("University of Maryland Medicine") has an annual budget of nearly $6 billion and an economic impact more than $15 billion on the state and local community. The School of Medicine faculty, which ranks as the 8th highest among public medical schools in research productivity, is an innovator in translational medicine, with 600 active patents and 24 start-up companies. Th School works locally, nationally, and globally, with research and treatment facilities in 36 countries around the world. Visit **medschool.umaryland.edu**.

About the Institute for Genome Sciences
The Institute for Genome Sciences, founded in 2007, is an international research center within the University of Maryland School of Medicine. Comprised of an interdisciplinary, multidepartment team of investigators, the Institute uses the powerful tools of genomics and bioinformatics to understand genome function in health and disease, to study molecular and cellular networks in a variety of model systems, and to generate data and bioinformatics resources of value to the international scientific community.
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