Gut microbiota of mouse pups regulated by hydrogen peroxide produced through lactation

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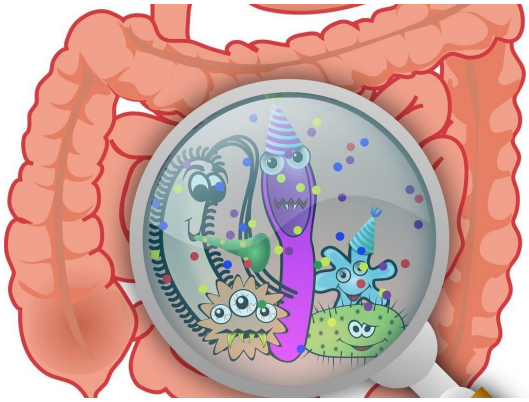

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A recent animal study published in *The FASEB Journal* explores the uncharted territory of how the gut microbiome develops in infancy. It was well known that breast-fed mouse pups have a simple bacterial population dominated by the health-promoting *Lactobacillus* bacteria. But the molecular mechanism of how mouse mother's milk suppresses a more diverse gut microbiome has been unclear.

Previously, researchers examined the role of L-amino acid oxidase 1 (LAO1)—an enzyme that converts L-amino acids into keto acids, ammonia, and hydrogen peroxide (H2O2)—in mouse mothers' milk. That study demonstrated that the H2O2 in milk prevented the mother's mammary gland from developing bacterial infectious disease, such as mastitis.

The same group of researchers conducted a more recent mouse study to consider whether the H2O2 generated by LAO1 might impact the development of infant gut microbiota via breast-feeding. Indeed, they found that LAO1 suppressed microbial diversity during the pups' gut microbiota development.

To conduct the study, researchers examined the amount of *Lactobacillus* in the microbiota of two groups of breast-fed infant mice: a control group and a group with a deleted (or "knockout") LAO1 gene. As expected, the mice in the control group displayed *Lactobacillus*-dominated microbiota. The microbiota of the LAO1-knockout mice, however, displayed lower levels of *Lactobacillus*. The study suggests for the first time that H2O2 acts as a gatekeeper for bacterial selection and the development of gut microbiota during lactation in mice.

"While there are many differences between human and mouse mothers' milk, both types of neonates have a low-diversity microbiota, which might be important to reducing their risk of disease in adulthood," said Kentaro Nagaoka, Ph.D., an associate professor at the Laboratory of Veterinary Physiology within the Tokyo University of Agriculture and Technology's Department of Veterinary Medicine. "There is a need for further research exploring how we can control breast milk compounds to ensure infants inherit the good microbiome."

"This was a clever and much-needed experiment, and the results have important human impacts," said Thoru Pederson, Ph.D., Editor-in-Chief of *The FASEB Journal*.

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