Bacteria help infants digest milk more effectively than adults

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Infants are more efficient at digesting and utilizing nutritional components of milk than adults due to a difference in the strains of bacteria that dominate their digestive tracts. Researchers from the University of California, Davis, and Utah State University report on genomic analysis of these strains in the November 2010 issue of the journal *Applied and Environmental Microbiology* identifying the genes that are most likely responsible for this difference.

"Human milk oligosaccharides (HMOs) are the third-largest solid component of milk. Their structural complexity renders them non-digestible to the host," say the researchers. "Bifidobacterium longum strains often predominate the colonic microbiota of exlusively breast-fed infants. Among the three recognized subspecies, B. longum subsp. infantis achieves high levels of cell growth on HMOs and is associated with early colonization of the infant gut."

In the study the researchers used whole-genome microarray comparisons to associate genotypic biomarkers among 15 B. longum strains exhibiting various HMO utilization patterns. They identified 5 distinct gene clusters on B. longum that were conserved (showed little or no variation) across all strains capable of growth on HMOs and have also diverged in strains incapable of growing on HMOs.

The results of this study suggest that B. longum has at least 2 distinct subspecies: B. longum subsp. infantis, adapted to ultilize milk carbon and found primarily in the digestive tract of children, and B. longum

subsp. longum, specialized for plant-derived carbon metabolism and associated with the adult digestive tract.

"Although early gut colonization is likely dependent on a multitude of dietary and nondietary factors, the delivery of complex oligosaccharides through milk creates an ideal and unique nutrient niche for the establishment of, and colonization by, B. longum subsp. infantis strains," say the researchers. "During weaning, a gradual transitioning from milk-based to plant-based diets generates a shift in carbon availability in the gastrintestinal tract favorable for the expansion and formtion of an adult-like gastointestinal tract microbiota."

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