

newborns fell into one of three microbiome profiles, each characterised by a different dominant pioneer bacterium.

Out of these pioneer bacteria, *Staphylococcus aureus* () and *Streptococcus pneumoniae* () are considered beneficial as they promote the stable colonisation of other beneficial microbes, and *Enterococcus faecalis* () is considered risky.

Staphylococcus aureus was found to come from the mother's gut during childbirth, however, the team found that *Streptococcus pneumoniae* was not transmitted in this way⁶. The team also uncovered that *Streptococcus pneumoniae* was genetically adapted to fully utilise the nutrients found in breast milk and can block potentially damaging pathogens from colonising the babies' guts.

Around 85 per cent of the babies studied were breastfed in the first few weeks of life. Researchers found that breastfeeding versus formula feeding did not seem to influence the type of pioneer bacteria in the baby's gut, however the use of antibiotics did⁷.

probiotic strains and development of novel microbiome-based therapeutics built on genomic research."

ENDS

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Notes to Editors:

The researchers would like to thank the participating families for their time and contribution to the Baby Biome Study and the research midwives at the recruiting hospitals.

1. The [UK Baby Biome study](#) is a large-scale UK birth cohort study and biobank, with longitudinal follow-up through electronic health data linkage. It aims to understand how interactions between microorganisms, the immune system, and clinical, social, and behavioural factors during pregnancy and early life influence later health and disease. Stool samples were collected from newborns and mothers, along with vaginal swabs from the mothers and umbilical cord blood. Funded by Wellcome, it was a collaboration between the Wellcome Sanger Institute, UCL, the University of Birmingham and collaborating hospitals.
2. Ennis, D., Shmorak, S., Jantscher-Krenn, E. Yassour, M. (2024) Longitudinal quantification of *Bifidobacterium longum* subsp. *infantis* reveals late colonization in the infant gut independent of maternal milk HMO composition. . DOI: [10.1038/s41467-024-45209-y](https://doi.org/10.1038/s41467-024-45209-y)
3. Casaburi, G . (2021)

this bacterium, however, researchers suggest that it could have been from another area of the mother, for example, the skin microbiome. It was also found to be more common in children whose mothers identified as Asian.

7. This study suggests that the use of antibiotics increases the chance of colonising infant guts, however, it is not clear if this has any long-term health impact. Profiling a newborn microbiome and developing personalised probiotic treatment could benefit infants with this microbiome profile.

Author interests:

Dr Trevor Lawley is also a co-founder and Chief Scientific Officer of Microbiotica, a clinic-ready biopharmaceutical company specialising in the development of precision live biotherapeutic

founding member of the Universitas 21 global network of research universities, the University of Birmingham has been changing the way the world works for more than a century.

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