

The evolution of infants' gut microbiota under different feeding regimes

Junbo Wang^{1,2}, Xinran Liu¹, Huijuan Ma¹, Xueqian Yin¹, Xiaoxuan Zhang¹, Jing Wen¹, Ning Yin¹, **Craig Kui Xie**³, Jinjing Zhong³, Yiqing Zhao³, Yanmei Hou³

1. Department of Nutrition and Food Hygiene, School of Public Health, Peking University, Beijing, China;
2. Beijing Key Laboratory of Toxicological Research and Risk Assessment for Food Safety, Peking University, Beijing, China;
3. Ausnutria Hyproca Nutrition Co., Ltd., Changsha, China

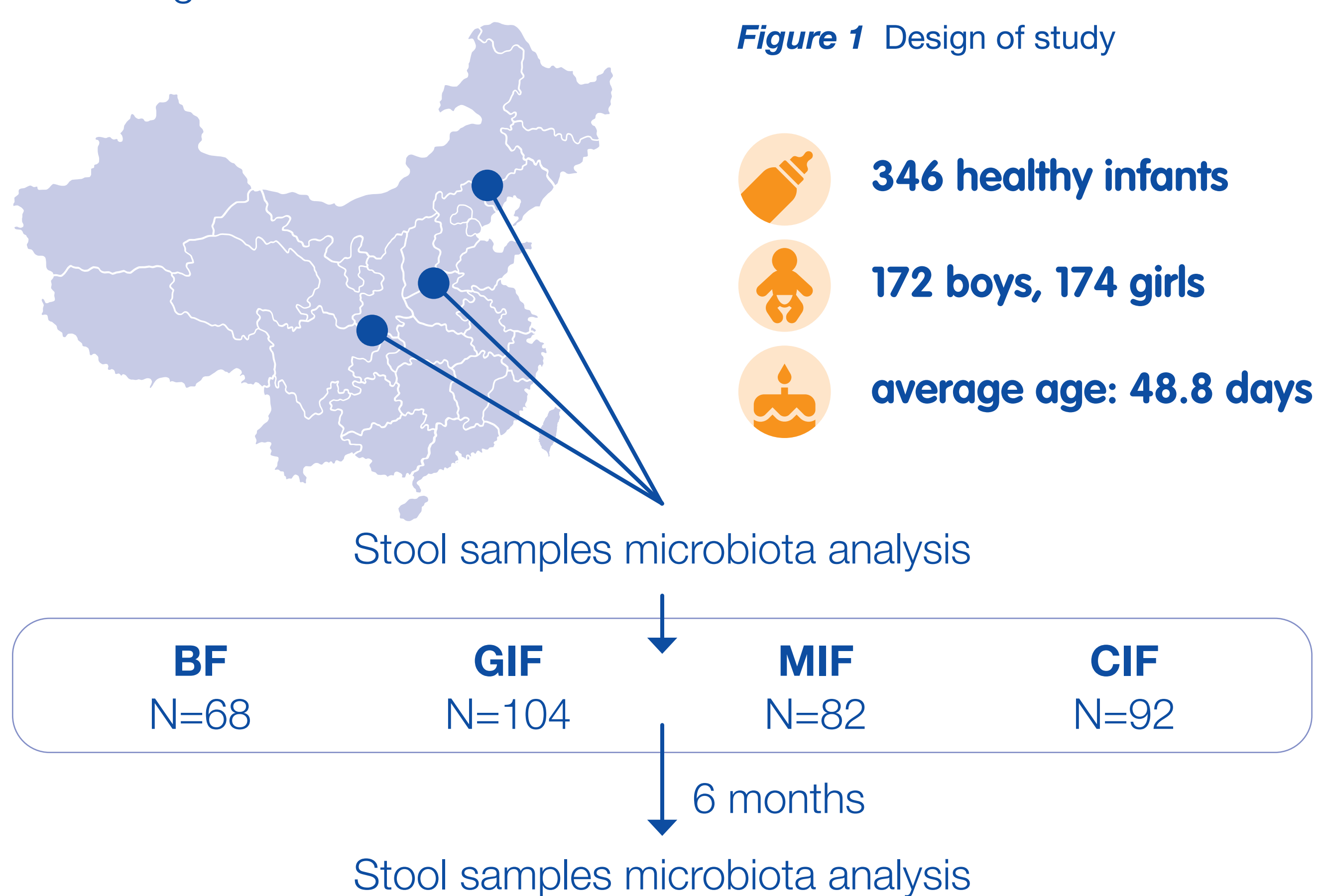
The gut microbiota at early life stage are shaped by various factors, including delivery methods, feeding modes, the environment, the maternal factor and others. The development of gut microbiota is important for the maturity of infants' immune system, as well as intestinal and digestive functions. However, there has been limited research into the gut microbiota of Chinese infants in general and into how they are affected by different feeding regimes in particular.

Objectives

The aim was to characterise the gut microbiota of Chinese infants who live in central and northern China and study the effect of feeding regimes on the composition and diversity of infants' microbiota.

Methods

346 healthy infants (172 boys and 174 girls) with an average age of 48.8 days in 3 different Chinese cities were recruited. Before recruitment, the infants were either exclusively breast-fed (BF), formula-fed, or mixed breast/formula-fed with formula comprising >40% of total feeding volume. After recruitment, the mixed breast/formula-fed infants were randomised to be fed with Kabrita goat milk-based infant formula (GIF, n=104), mixed cow and goat milk-based infant formula (MIF, n=82) and cow milk-based infant formula (CIF, n=92), respectively. Before and after the feeding intervention, stool samples were collected and microbiome composition was determined using Illumina Miseq sequencing, by targeting the V3-V4 region of 16S rRNA.



Conclusions:

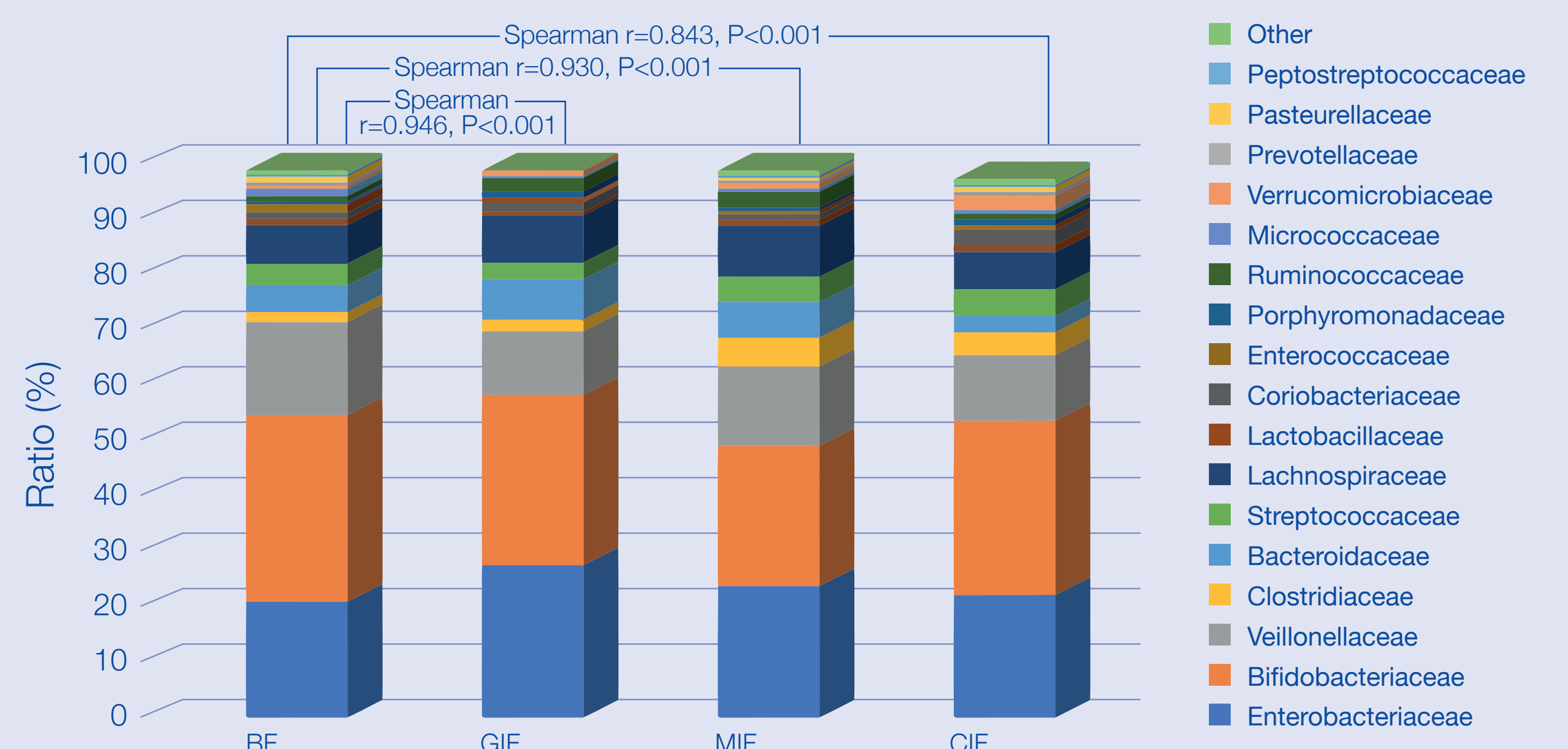
1. Enterobacteriaceae, Bifidobacteriaceae and Veillonellaceae are the most abundant bacteria in the gut of Chinese infants.
2. The abundance of Bifidobacteriaceae and Veillonellaceae are increased after 6 months of feeding, for all groups.
3. Infants fed with GIF have the highest increase in bifidobacterial abundance.
4. There is no significant difference in microbiota diversity between breast-fed infants and formula-fed infants.

Results

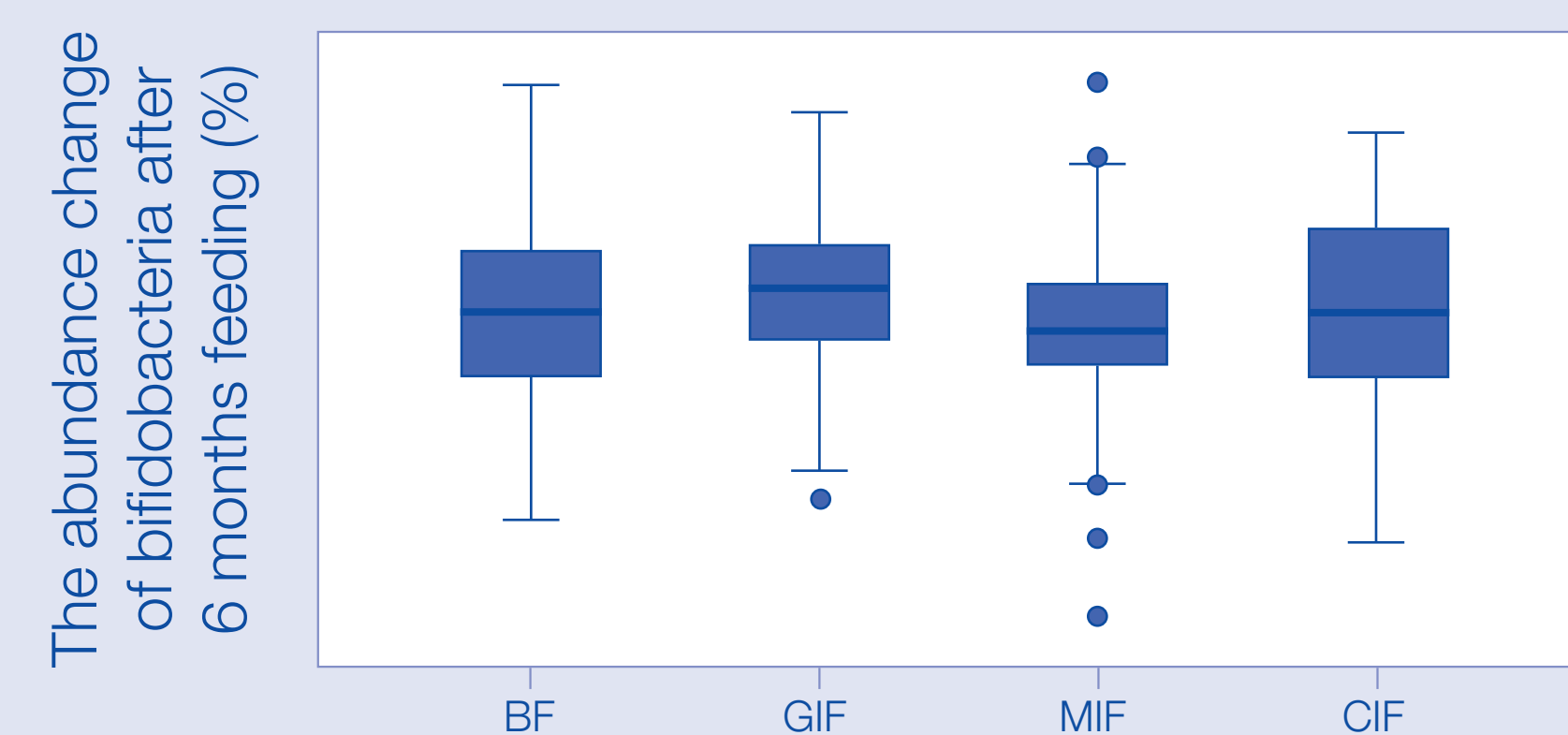
Once the trial started, formula-fed and mixed breast/formula-fed infants were randomly allocated to the GIF, MIF or CIF group; the feeding regime of the BF infants was not altered.

At the time of recruitment, BF infants had more Bifidobacteriaceae and Clostridiaceae, but less Enterobacteriaceae and Veillonellaceae than infants in other groups. After 6 months of feeding in the study, the proportion of Bifidobacteriaceae and Veillonellaceae increased, while the proportion of Enterobacteriaceae and Clostridiaceae decreased in BF infants. Other feeding groups also showed an increase in the abundance of bifidobacteria and a decrease in Enterobacteriaceae bacteria.

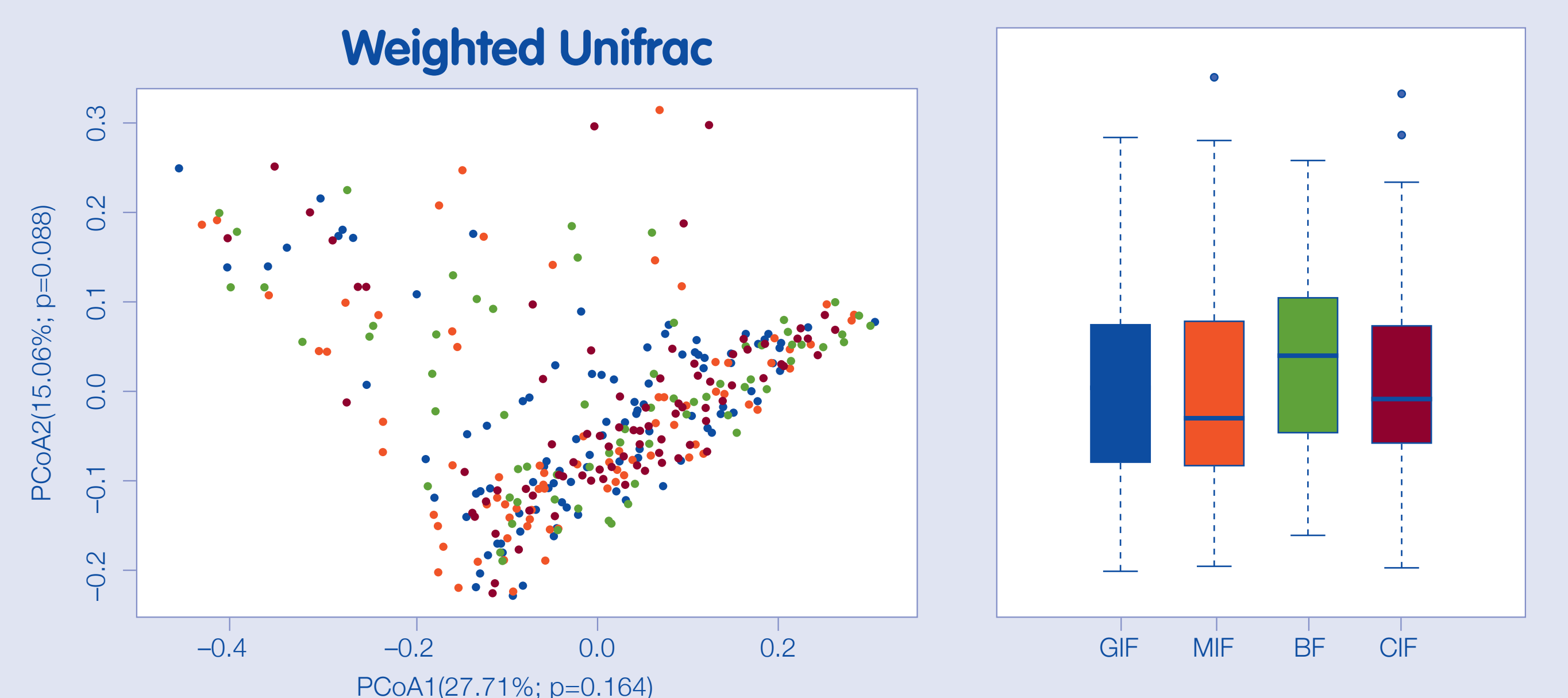
Moreover, the results showed that Bifidobacteriaceae, Enterobacteriaceae and Veillonellaceae accounted more than 60% of the microbiome in all groups at the end of the intervention. The microbiota profile of infants fed with GIF was similar to that of BF infants.



After 6 months, the bifidobacterial abundance in BF infants increased by 10.5%, while that in infants fed with GIF, MIF and CIF increased by 15.0%, 8.0% and 10.7%, respectively.



Principal components analysis showed that there were no significant differences ($p>0.05$) in the diversity of infants' microbiota between the different groups, not at the time of recruitment nor after 6 months of feeding.



Conflict of Interest: Craig Kui Xie, Yiqing Zhao and Yanmei Hou are employees of Ausnutria Hyproca Nutrition; financial support was obtained from Ausnutria Hyproca Nutrition.

Disclaimers:

Information for medical professionals only. Ausnutria acknowledges that breastfeeding is the best food for infants aged 0-6 months and supports prolonging breastfeeding to 24 months (age 2).

