Diversity of immunoglobulin-coated archaea in human colostrum and neonatal stool from Mexican individuals

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Abstract

Archaea are anaerobic prokaryotes that belong to a lineage independent of Bacteria that were recently detected in feces from human adults, breast milk, and meconium of healthy donors, suggesting that they are members of the human microbiota, and potentially, early colonizers of the gut. During breastfeeding, colostrum carries one of the first inoculums of immunoglobulin-coated bacteria that will promote the environmental development of the gut as well as the immune system of the newborn. However, it is unknown if these immunoglobulins coat archaea to mediate their selection in the gut.

We aimed to describe the composition of the archaeal community in colostrum donated by Mexican women and newborn feces to evaluate if these taxa are bound differently. Therefore, we selected good-quality DNA isolated from colostrum/feces cells sorted by magnetism using complexes of monoclonal anti- IgA1, IgA2, IgG, and IgM bound to magnetic beads and carried massive 16S amplicon sequencing to determine their taxonomy.

Methanosarcina and *Methanoculleus* are the most abundant genera and they are coated by the four immunoglobulin subtypes, whereas rare genera are bound by IgM in colostrum but by IgG in feces. Interestingly, functional metagenome prediction shows that while archaea in colostrum are associated to anaerobic respiration, nucleotide and amino acid biosynthesis are the most abundant pathways in newborn feces. Our results suggest that maternal immunoglobulins bind differentially to archaea that might be pioneer colonizers and that the modeling of the gut environment may start as early as the newborn starts breastfeeding. Work supported by CONACyT 163235 INFR-2011-01 and CONACyT FORDECYT-PRONACES/6669/2020_Programa Presupuestario F003-Ciencia de Frontera 2019.