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Abstract

Recolonization of Pasteurized Donor Milk with Mother's Own Microbiome †

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Abstract: Preterm infants are often fed heat-pasteurized (HP) donor human milk (DHM), which is void of live microbes. Previous attempts to restore the microbiome of DHM by inoculation with small quantities of mother's own milk (MOM) have been semi-successful. However, the resulting bacterial profiles are only a partial match to the mother's original microbiota potential due to the altered biochemistry of HP DHM. UVC irradiation reduces bacterial load in donor milk to a similar standard as HP, while preserving non-microbial bioactive components. We therefore hypothesized that the efficacy of DHM restoration will be improved using UVC-irradiated DHM compared to HP DHM. DHM batches (n = 3) were divided into two equal aliquots: one for HP, and one for UVC irradiation. Pasteurized DHM was inoculated with fresh MOM (n = 9) at the following v/v ratios: 5% MOM, 10% MOM, 30% MOM. Samples were incubated at 37 °C for 8 hours, with samples taken every 4 hours. Microbiome restoration was assessed using bacterial culture and viability-coupled 16S rRNA gene sequencing. Both pasteurization techniques were successful with no bacterial growth over the course of the experiment. MOM microbiota were able to expand in both UVC and HP DHM, although growth was more rapid in HP DHM. Overall, HP DHM inoculated with 10–30% MOM and incubated for 4 h most closely resembled baseline fresh MOM. Notably, after 8 hours of incubation, bacterial growth far surpassed baseline MOM levels. This kind of florid growth may be undesirable in a NICU setting where immature and vulnerable infants are fed recolonized DHM. Our results suggest that DHM can be personalized by inoculating with 10–30% MOM and incubating for 4 h. UVC irradiation does not improve recolonization, potentially due to the retention of antimicrobial properties in this type of milk.

Keywords: human milk; mother's own milk; donor human milk; human milk microbiome; heat pasteurization; UVC irradiation; bacterial load

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