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Impact of pasteurization techniques and time-temperature combinations on the antiviral action of human milk

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ABSTRACT

A mother's own milk is the first choice for improving the short- and long-term outcomes for all newborns, including preterm infants. Human milk encompasses many kinds of biological functions, including intrinsic antiviral properties for the presence of specific bioactive and immunomodulatory factors involved in the milk-mediated defense system against viral infections. In this context, our research group of virologists contributed demonstrating the antiviral role of several components, such as the colostrum-derived extracellular vesicles and glycosaminoglycans, and exploring their mechanism of action. However, despite the presence of protective factors in human milk, breastfeeding can be a route of transmission for viruses from mother to infant When a mother's own milk is unavailable or in short supply, the use of donor milk (DM) represents the best alternative; in this context, the heat treatment of DM is mandatory in human milk banks (HMBs) to guarantee microbiological safety. Currently, the Holder pasteurization (HoP) process is recommended in international guidelines for the constitution of HMBs. However, it's established that HoP affects several milk components to variable degrees, with a marked effect on milk protein content and activity. Therefore, HMBs and researchers are committed to developing novel or enhanced methods to process DM that can ensure microbial inactivation, while improving the preservation of its nutritional, immunological, and functional constituents. In this context, in collaboration with neonatologists we studied and compared the impact of HoP, the High Temperature Short Time pasteurization (HTST) and different time-temperature combinations on the antiviral activity of human milk against a panel of viruses of concern in the pediatric field, including cytomegalovirus, respiratory syncytial virus, rotavirus, and on its biological components, such as the immunoglobulin content. Our studies open the debate on whether the pasteurization temperature commonly used in Human Milk Banks should be changed to better preserve the biological components of milk.

BIOGRAPHY

Manuela Donalisio is Associate Professor of Microbiology at the Department of Clinical and Biological Sciences of the University of Turin, Italy. Her research interests have focused mainly on the study of the antiviral activity of human milk and preservation of its biological functions, the discovery and development of antiviral molecules and nano-formulations, studies on virus-cell interactions in order to deepen the knowledge on the viral pathogenesis and to identify new pharmacological targets. Her studies of Antiviral Research are applied to

a wide panel of viruses, including respiratory viruses responsible for annual large outbreaks, sexually transmitted viruses, emerging arthropod-transmitted viruses and viruses responsible for gastrointestinal infections.
These multidisciplinary studies have been performed in collaboration with neonatologists, chemists and engineers of national and international Universities and with pharmaceutical and biotech companies. To date she is author of more than 60 publications in peer-reviewed journals and her publication h-index is 26. She has been serving as an editorial board member of reputed journals.

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