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A new high hydrostatic pressure destroyed all pathogens including spores while preserving the bioactive proteins of donated human milk

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Background: The main process used to pasteurize human milk is the low-temperature, long-time Holder method (HOLDER and recently investigated, the high-temperature, short-time method). Both processes lead to an appropriated inactivation of vegetative forms but are ineffective versus the bacterial spores.

Research Aims: Find a method accomplish two main objectives: inactivation of all pathogens, including spores, and preservation of the activity of milk components.

Design/Methods: Recently, a novel approach of the high hydrostatic pressure processes have been developed by HPBioTECH. We compared the effect of human milk treatment on the same samples (raw human milk, holder and our novel high hydrostatic pressure) on vegetative and spores forms of pathogens and on bioactive components (lipase activity, immunes proteins).

Results: a) Pathogens destructions: two main microbial strains have been selected: Staphylococcus aureus (as reference for the vegetative forms) and Bacillus cereus (as reference for spores). This research led process adapted to the a) microbial decontamination of 6 log, either for Staphylococcus aureus or Bacillus cereus, b) Human milk bioactive components: the main components of human milk is preserved. Activity of the lipase after this treatment (close to 80%) and that of several additional components (α-lactalbumin: 96-99%: Casein: 98-100%, Lysozyme :95-100%; lactoferrin: 93-97%; sIgA: 63-64%).

Conclusions: This novel high hydrostatic process generate microbiologically safe human milk could potentially result in important benefits for preterm infants: (i) improved assimilation of human milk, leading to daily weight and (ii) improved resistance to infections(iii) to avoid discarding 10% of contaminated by Bacillus Cereus human milk collected.

Speaker Biography

Claude Billeaud received his MD degree from the Medical University of Bordeaux (France) in 1979 after a graduation in human cytogenetics (1976). He then studied pediatrics and has been the Clinical Assistant Director of Bordeaux University in the departments of Pediatrics, Neonatology and Intensive Care since 1983. He currently serves as a pediatrician in the neonatal unit at the Children's Hospital of Bordeaux, as a scientific manager of Bordeaux-Marmande human milk bank, as a lecturer and head of research in neonatal nutrition at the Medical University of Bordeaux. His particular interest in research led him to graduate in Biology and Health (1988, Bordeaux), be awarded a master in statistics applied to clinical research (1991, Montreal) and complete a PhD in nutrition and food science (2000, Bordeaux). Along his career he has often been invited as a guest professor specialized in nutrition and neonatology in various universities abroad (Montreal, Corrientes in Argentina). Over the last 35 years, he has been an active member of different scientific organizations, either French, European or American, specialized in perinatal medicine (neonatology, pediatrics and nutrition). In this instance, he has served as the President of the Association for Pediatric Education in Europe (A.P.E.E) since 2008. He has also been very involved in the French human milk banking association (ADLF) for more than 10 years, sharing his academic knowledge focused in nutrition and his long clinical experience in neonatology. He is currently carrying out several researches on the composition of human milk. As an expert in nutrition and perinatal medicine, he is also the author and co-author of numerous scientific publications.

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