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Changes in breast milk components and temperature using the milmo®, a new water-free breast milk pasteurizer

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Background

- It Is important to prevent breast milk-acquired cytomegalovirus (CMV) infection in preterm infants.
- Holder pasteurization (HP) at 62.5℃ for 30 minutes is used for prevention, but it is challenging to implement in clinical practice and is uncommon in Japan.
- The milmo® (Hokuyo denki Co. Ltd) , a new water-free pasteurizer, has been shown to eliminate CMV infectivity; however, its effect on breast milk (BM) components is unknown.

Objective

Our study aims to investigate the effects on BM components measured before and after pasteurization with milmo®, as well as temperature changes with varying volumes from refrigerated and frozen conditions during HP with milmo®.

The milmo®, a new water-free pasteurizer

The milmo® is the world's first device capable of pasteurizing BM while it remains sealed in a commercially available softbag.

Features http://www.hokuyo-denki.co.jp/milmo/

- Can sterilize with a small amount of liquid (up to 160mL per pack)
- Equipped with two sterilization units
- Can sterilize packs from refrigerated or frozen conditions

Process of HP by the milmo®

The softbag is placed in a protective bag and secured into the machine.
Once the button is pressed, heating begins automatically.
The device then performs HP at 62.5℃ for 30 minutes.

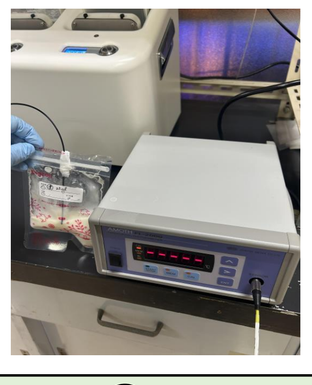
Methods① Components of BM

Refrigerated BM(4℃) N=15
Frozen BM (-20℃) N=14
→ HP with milmo®

Analysis: Energy, Fat, Protein
Secretory IgA(sIgA), Lactoferrin

Components in 29 BM samples provided to the human milk bank were measured before and after pasteurization with milmo®.

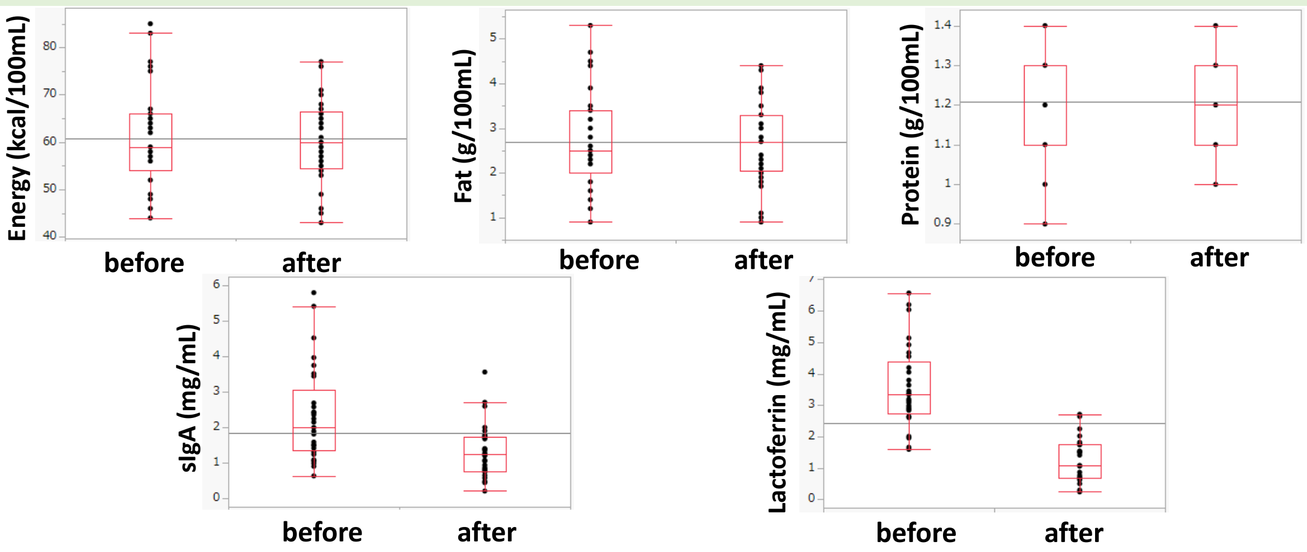
Methods② Temperature changes by different volumes



Volumes tested:
25ml, 50ml, 80ml, and 100ml
Conditions: refrigerated and frozen

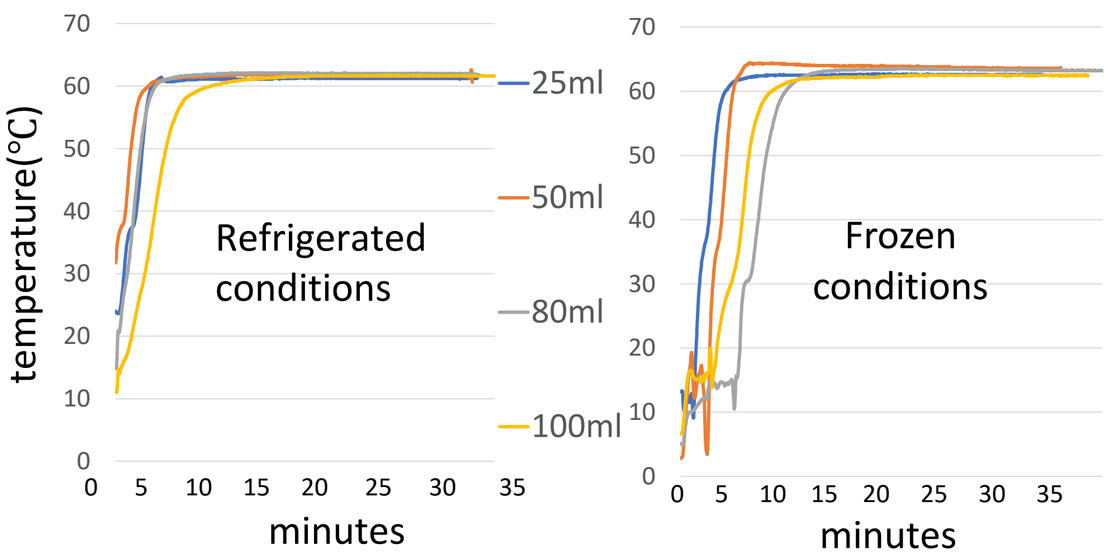
Temperature changes during HP with milmo® were measured.

Results① Components of BM



There were no significant differences in energy, fat, and protein.
However, there were significant differences in the mean concentrations of sIgA and lactoferrin, with reductions of 40% and 66%, respectively, throughout the process.

Results② Temperature changes by different volumes



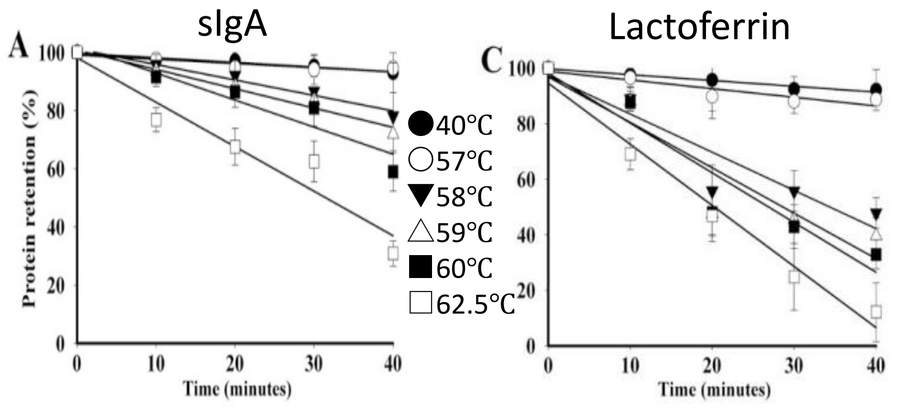
The time to reach 62.5℃ was shorter for refrigerated BM than for frozen BM.

Discussions① Comparison

		Macronutrient	sIgA	Lactoferrin
Chang JC, et al. *Pediatr Neonatol.* 2013;54(6):360-6		—	-25.9% ELISA	-66% ELISA
Czank C, et al. *Pediatr Res.* 2009;66(4):374-9		—	-27.7% ELISA	-78.2% ELISA
Piemontese P, et al. *BMC Pediatr.* 2019;19(1):58		Energy -2.48% Fat -4.79% Protein -2.51% Miris	—	—
Vieira AA, et al. *Early Hum Dev.* 2011;87(8):577-80		Fat -5.5% Protein -3.9% Milko-scan Minor™	—	—
The study	**Total** **Refrigerated** **Frozen**	**No changes**	**-40.5%** **-40.3%** **-40.8%**	**-66.7%** **-80.5%** **-43.8%**

The mean concentrations of sIgA and Lactoferrin did not differ from the reductions observed with other HP instruments.

② Changes in sIgA and lactoferrin



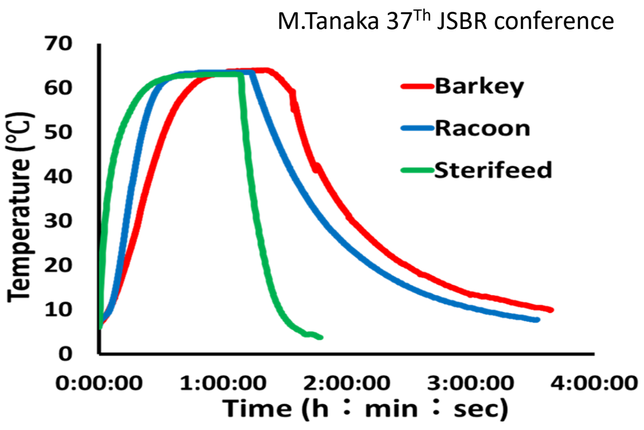
The longer the time and the higher the temperature, the more sIgA and lactoferrin are lost under HP conditions. Czank C, et al. *Pediatr Res*. 2009;66(4):374-9

Under HP conditions(62.5℃ for 30minutes)
sIgA decreased by 1.6% per minute
Lactoferrin decreased by 2.4% per minute

③ Temperature changes

Temperature changes by general pasteurizers

M.Tanaka 37Th JSBR conference



The temperature changes observed in HP using Milmo® were equivalent to those in other pasteurization methods.

Conclusion

The changes in the components of BM related to HP with milmo® are equivalent to those observed with other pasteurization methods, making it a useful approach for preventing CMV infection.