

# EFFECTS OF PASTEURIZATION ON REDOX PROPERTIES OF COLOSTRUM AND MILK FROM MOTHERS OF PRETERM INFANTS



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Donated milk represents a desirable alternative to formula feeding, especially for preterm infants. Milk banks collect both preterm and term human milk and apply pasteurization to remove possible infectious contaminants.

## Aims

We examined the effects of pasteurization on redox properties of milk from mothers of preterm infants and its fractions.

## Methods

Milk was obtained from ten mothers of preterm infants (gestational age 28-36 weeks; birth weight 900-2,470 g). Milk samples were obtained within the first 4 days after delivery (colostrum), from day 4 to two weeks (transient), and 6 weeks and later (mature milk). Electron paramagnetic resonance spectroscopy of hydroxyl-radical generating Fenton system was applied to analyze redox properties of milk from mothers of preterm infants.

## Results

Colostrum showed drastically higher capacity for hydroxyl radical removal compared to transient and mature milk from mothers of preterm infants. The signal of ascorbic radical was very weak in pasteurized milk, whereas the intensity of urate radical adduct was higher compared to fresh milk (Fig. 1). A significant negative correlation is present ( $R = -0.797$   $p < 0.0001$ ) between signal intensities of urate radical adduct and ascorbic radical only in pasteurized milk.

## Conclusion

Milk from mothers of preterm infants has high redox capacity (Fig. 2), and it is a very important for growth and development of premature infants. However, redox capacity decrease during lactation, and pasteurization appears to undermine the redox properties of the milk.

## Acknowledgments

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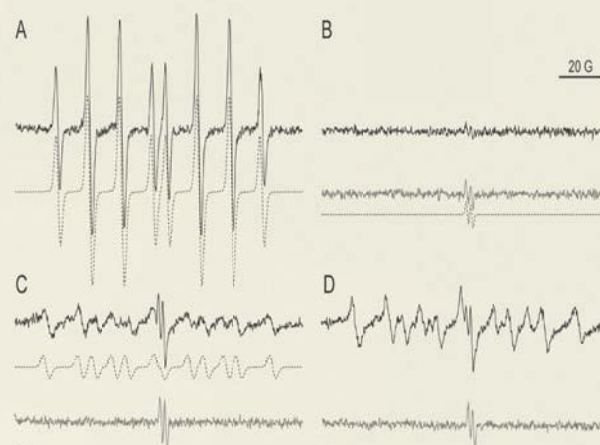


Figure 1. EPR spectra and quantification of redox activity of colostrum and milk exposed to hydroxyl radical-generating system. (A) Control system – Fenton reaction:  $\text{Fe}^{2+}$  (0.6 mM) +  $\text{H}_2\text{O}_2$  (3 mM). Dotted line – simulation of EPR signal of  $\text{DEPMPO}/\text{OH}$  (signal intensity was  $2685 \pm 384 \text{ AU}$ ). (B) Colostrum exposed to Fenton reaction. No clear signal of  $\text{DEPMPO}$  adducts could be identified. Gray line – EPR spectrum obtained in the same system in the absence of spin-trap. Dotted line – simulation of EPR signal of  $\text{Asc}^{\bullet-}$ . (C) Fresh milk exposed to Fenton reaction. Dotted line – simulation of EPR signal of  $\text{DEPMPO}/\text{UA}$ . (D) Pasteurized milk exposed to Fenton reaction. Black bars – colostrum; white bars – untreated milk; gray bars – pasteurized milk. \* – significant compared to untreated human milk at 0 day ( $p < 0.05$ ).

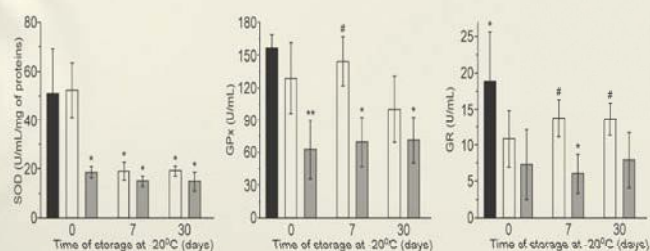


Figure 2. Redox settings in colostrum, and raw and pasteurized human milk. (A) SOD activity; (B) GPx activity; (C) GR activity. Black bars – colostrum; white bars – untreated milk; gray bars – pasteurized milk. \* – significant compared to untreated human milk (0 day); \*  $p < 0.05$ ; \*\*  $p < 0.001$ . # – significant compared to pasteurized milk at the same (7 or 30) day of storage at  $-20^\circ\text{C}$ .