

**Heat Treating Breast Milk as an Infant Feeding Option**

We appreciated the recent article by Hartmann et al, "Alternative Modified Infant-Feeding Practices to Prevent Postnatal Transmission of Human Immunodeficiency Virus Type 1 Through Breast Milk: Past, Present, and Future."<sup>1</sup> We would like to take this opportunity to clarify and expand upon their information regarding heat-treating breast milk as an infant feeding option, particularly the method protocol and its impact on nutrients and immunological properties of breast milk.

As mentioned by Hartmann et al, heat treatment is 1 World Health Organization (WHO) endorsed infant feeding method. Specifically, the WHO lists 2 options: (a) direct boiling, shown to cause significant nutritional damage, and (b) pasteurization, such as Holder Pasteurization (62.5°C for 30 min),<sup>2</sup> which has been reported to inactivate HIV while retaining the majority of breast milk's protective elements<sup>3-6</sup> but requires temperature gauges and timing devices unavailable in most at-risk communities.<sup>7</sup> Given the issues with the above methods, we have designed a simple flash-heat treatment method that a mother could use in her home or over a fire, similar to commercial high-temperature, short-time (HTST) pasteurization.<sup>8,9</sup> The flash-heat method was developed from work reported by Chantry et al in 2000, which used small milk volumes and Pyrex glass and boiled the milk.<sup>2</sup> However, this method has been revised to heat the milk more gently, and currently flash-heat is defined as placing 50 mL of breast milk in an uncovered glass peanut butter jar in 450 mL of water in an aluminum pan then heating both together over a flame until the water reaches 100°C and is at a rolling boil. The breast milk is then immediately removed from the water. Although Hartmann et al described flash-heat as "boiling" the breast milk, the flash-heat method described by Israel-Ballard et al in 2005<sup>10</sup> calls for the water to come to a boil, not the breast milk. This is an important clarification, as it impacts the entire method, most notably the temperatures reached and

undoubtedly the immunologic and nutritional impact on the milk. Indeed, the water bath acts to protect the breast milk from the direct heat of the flame. Samples that underwent flash-heat typically reached a peak temperature of 72.9°C.

We agree with the concerns of Hartmann et al regarding the impact of heat on vitamins, proteins, immunoglobulins, and the antimicrobial properties of breast milk. We direct the readers to our recent pilot data exploring this issue.<sup>10</sup> Low-temperature, long-time (LTLT) heat treatments, for example, Holder pasteurization, typically preserve nutrients less than do HTST methods. Our data suggest limited impact from flash-heat on vitamins, proteins, and antimicrobial properties.<sup>10,11</sup> Our ongoing study is investigating the above concerns in depth, and we hope to have these data available in the near future.

We also acknowledge the authors' concerns that women may find the practice to be cumbersome. However, we point your readers to our article that appeared in the same issue of *JHL*, which presents acceptability data from Zimbabwe suggesting that participants viewed heat treatment of breast milk as a potentially practical option, despite all of its challenges.<sup>7</sup>

In light of the potential risks of formula feeding in resource-poor regions, we applaud all efforts to explore safe and practical modifications to breastfeeding for HIV-positive mothers who desperately need options. We look forward to further such reviews.

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### **Response to Heat Treating Breast Milk as an Infant Feeding Option**

We would like to respectfully respond to the letter submitted by Israel-Ballard et al. regarding our manuscript "Alternative Modified Infant-Feeding Practices to Prevent Postnatal Transmission of Human Immunodeficiency Virus Type 1 Through Breast Milk: Past, Present, and Future"<sup>1</sup> published in the February 2006 issue of the *JHL*. We acknowledge the significant contributions Ms. Israel-Ballard and her colleagues have made to the field in the past year by expanding the knowledge of the use of Flash-Heat treatment of human milk for prevention of HIV-1.<sup>2-4</sup> We regret that such contributions were not included in our review article. However, we would like to clarify that such omissions were due to editorial delays and not due to our oversight. Our manuscript was submitted to *JHL* in September 2004 and accepted after a long review period in June 2005. Unfortunately, the manuscript was not published until February 2006. At this juncture, we appreciate the clarification Ms. Israel-Ballard and her colleagues present in their letter regarding their original heat treatment method for inactivation of

HIV-1 in human milk, in which "milk was brought to a boil in a small water bath,"<sup>5</sup> and their revised Flash-Heat method, in which the water boils, but not the milk. With the same goals in mind as our colleagues in California, we too look forward to more research advances that offer options for prevention of postnatal transmission of HIV-1 through milk.

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### **Boxing Neonate on an Engorged Breast—A New Behavior Identified**

Exclusive breastfeeding, an important component of essential newborn care, can be propagated if positioning, attachment, and latching on a nonengorged breast is done properly.

It was observed during postnatal visits that when the breast is engorged, the infant does not suckle and pushes himself away with his fistful hands at the breasts or abdomen of the mother, and kicks away at the mother's abdomen and avoids feeding.

This newly identified, interesting behavior of avoiding and pushing away at the engorged breast by a neonate as if he is boxing can be considered as a sign of breast engorgement (BE). This behavior if observed is a valuable tool to suspect or diagnose BE.

During BE, the breasts become firm on palpation instead of soft, with fullness and pain. A soft breast has the consistency of a water-filled glove or balloon, and after engorgement it may be likened to the consistency of a soft eraser. A newborn infant while latching onto an engorged breast is able to perceive the hardness of breast tissue and promptly pushes himself away, cannot suckle at the firm breast, refuses to feed, and does not get enough milk, and the mother complains of pain in the breast and that the baby is not feeding.

In such situations, when mother tries to feed her baby, I have observed a behavior not reported elsewhere. The behavior is that the newborn is seen to be pushing away at the breast with its fist that is near the mother's abdomen, and kicks away at the mother's abdomen, as if he is boxing. This behavior is not seen in all neonates who are put to engorged breasts but is seen in a small number (<15%) of such situations only. The practice of rooming-in and breastfeeding soon

after birth is increasing; therefore, this behavior is seen less and less as time passes.

There are few studies on how to identify an engorged breast,<sup>1,2</sup> and 2 have even devised instruments to measure breast hardness and edema.<sup>3,4</sup> This behavior, if observed, favors a diagnosis of BE and is easy to recognize; therefore, all those who work in the field of mother and child health can benefit from it.

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