The evolutionary ecology of breastmilk folate among Ariaal agro-pastoralists in Kenya

MASAKO FUJITA1,2, NERLI PAREDES RUVALCABA1,2, and MARY CORBITT2,3.
1Department of Anthropology, Michigan State University, 2Biomarker Laboratory for Anthropological Research, Michigan State University, 3Department of Animal Science, Michigan State University

Objective: Folate in breastmilk has important implications for offspring health and survival given the essential role of this vitamin in DNA synthesis, epigenetic functions, and amino acid metabolism. Yet, little is understood about the variation of folate in breastmilk and transfer across the postpartum year and beyond. Published studies tend to be limited to milk during days/weeks postpartum, and none applied an evolutionary perspective of parental investment. **Methods**: A secondary analysis of the data and specimens from 200 breastfeeding mothers within 1.5 years postpartum in food-insecure northern Kenya was conducted. ELISA determined folate-binding protein (FOLR1) in cryogenically archived breastmilk and maternal blood specimens, originally collected in 2006. Maternal folate was defined as blood serum FOLR1 multiplied by –1 because elevated FOLR1 is associated with folate deficiency. The concentration of milk FOLR1 was evaluated in relation to maternal folate and 1) infant sex (Trivers-Willard hypothesis), 2) time postpartum and parity (maternal residual reproductive value) using regression models adjusted for covariates. **Results** indicated: 1) no Trivers-Willard effect; 2) support for time postpartum but not for parity. Maternal folate and time postpartum inversely predicted milk FOLR1. There was an interaction between these variables ($p<0.05$). Maternal folate improved over time at a varying rate while milk FOLR1 decreased at a relatively steady rate. This inverse relationship became stronger as time advanced. **Conclusion**: The priority shift from the investment in current offspring toward maternal soma and potential future offspring in this study provides empirical support for the evolutionary hypothesis of parental investment and parent-offspring conflict.

This study was funded by NSF (BCS #1638167), and the Wenner-Gren Foundation (Grant #9278). The original data/specimen collection was supported by NSF (BCS #0622358) and the Wenner-Gren Foundation (Grant #7460).