Breast milk cellular HIV-specific interferon-? (IFN-?) responses are associated with protection from peripartum HIV transmission.


Abstract

OBJECTIVE: Breast milk is a major route of infant HIV infection, yet the majority of breast-fed, HIV-exposed infants escape infection by unknown mechanisms. This study aimed to investigate the role of HIV-specific breast milk cells in preventing infant HIV infection.

DESIGN: A prospective study was designed to measure associations between maternal breast milk HIV-specific interferon-? (IFN-?) responses and infant HIV-1 detection at 1 month of age.

METHODS: In a Kenyan cohort of HIV-infected mothers, blood and breast milk HIV-gag IFN-? ELISpot responses were measured. Logistic regression was used to measure associations between breast milk IFN-? responses and infant HIV infection at 1 month of age.

RESULTS: IFN-? responses were detected in breast milk from 117 of 170 (69%) women. IFN-? responses were associated with breast milk viral load, levels of macrophage inflammatory protein (MIP) 1a, MIP-1? , regulated upon activation, normal T-cell expressed, and secreted and stromal-cell derived factor 1 and subclinical mastitis. Univariate factors associated with infant HIV infection at 1 month postpartum included both detection and breadth of breast milk IFN-? response (P = 0.08, P = 0.04, respectively), breast milk MIP-1? detection (P = 0.05), and plasma (P = 0.004) and breast milk (P = 0.004) viral load. In multivariate analyses adjusting for breast milk viral load and MIP-1? , breast milk IFN-? responses were associated with an approximately 70% reduction in infant HIV infection [adjusted odds ratio (aOR) 0.29, 95% confidence interval (CI) 0.092-0.91], and each additional peptide pool targeted was associated with an approximately 35% reduction in infant HIV (aOR 0.65, 95% CI 0.44-0.97).

CONCLUSION:

These data show breast milk HIV-gag-specific IFN-? cellular immune responses are prevalent and may contribute to protection from early HIV transmission. More broadly, these data suggest breast milk cellular responses are potentially influential in decreasing mother-to-child transmission of viruses.