

AnotherLook

at breastfeeding and hiv/aids

Infectious HIV in Breastmilk: True or False?

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Public policy on infant feeding for children of HIV-positive women is increasingly driven by the assumption that infectious HIV is present in breastmilk, and that this poses a greater danger to children than formula feeding. According to the widely accepted estimate of Dunn [1992], breastfeeding will not change the HIV status of 86% of infants, but 100% of infants of HIV-positive women will be exposed to the negative effects of formula feeding.

It is vitally important to question the fundamental science underlying this assumption. How is HIV detected in breastmilk and in children, and how is it known when transmission is due to breastfeeding?

Antibody Tests

HIV infection is normally diagnosed by antibody tests (at best, 2 consecutive positive ELISA tests and 1 positive Western Blot). However, antibodies cannot be used to detect HIV infection in babies because the antibodies may be passed to the them from their mother. Studies have shown many fluctuations from HIV-positive to HIV-negative (and vice-versa) in young children [Hira, 1989]. It is often inferred that if a child is HIV-negative at birth but by somewhere between 9 and 18 months is HIV-positive, then HIV transmission must have occurred after birth. However, this cutoff is arbitrary, based on the assumption that maternal antibodies cannot last this long. But, what if breastmilk, which contains antibodies, can help them persist?

Antigen Tests

Antibodies are the immune system's reaction to a foreign body, and persist after the foreign object is eliminated. Antigens are proteins from the foreign body (e.g. bacteria or virus). It would seem that antigens should be taken more seriously than antibodies. Yet, for HIV, this is not the case. One study showed that only 15% of expectant mothers with HIV antibodies were also positive for HIV antigen [Blanche, 1994], another found antigens occurred in uninfected human placentas [Faulk, 1991] and another found no antigens in newborns later defined as HIV-infected [Rogers, 1989]. These inconsistencies have resulted in antigen tests being given little weight for mothers, babies or others. Presence of HIV antigens in breastmilk is relatively meaningless given this data.

Genetic Tests

Genetic tests are usually referred to as 'viral load', and are based on the Polymerase Chain Reaction (PCR). PCR is actually a method for manufacturing DNA, not counting it. PCR causes a 'population explosion' of DNA or RNA and by comparing the end-result with samples of various known concentrations, it is believed that the amount of HIV DNA or RNA can be calculated. Unfortunately, errors multiply exponentially with this test, it is so sensitive that contamination is a serious problem, the tests are not approved for, nor designed for diagnostic purposes [Rich, 1999] and the vast majority of what they measure is 'uninfectious' virus [Piatak, 1993]. HIV DNA tests are particularly unreliable, sometimes giving similar rates of positive tests for both HIV-antibody positive and negative people [Busch, 1992]. However, for infants (because of the inapplicability of antibody tests) genetic tests are the fastest and easiest to perform. Much of the belief that HIV is transmitted in breastmilk relies on the use of these tests, yet there are no comparisons of the test in a variety of HIV uninfected populations to establish the rate of false positives (reported in anecdotal evidence and small studies). One study found the tests positive in less than half of newborns later ruled to be HIV-positive [Dunn, 2000]. Another study found very little correlation between the presence of HIV DNA and HIV RNA in breastmilk [Lewis, 1998].

Co-Culture

Co-culture is believed to be the best HIV test available. It is less often used because it is time consuming and expensive. It is often called 'isolation' of HIV but the cell culture is neither initiated with purified HIV, nor is purified HIV obtained after culturing. Indirect and non-specific measures of the presence of HIV (e.g. antigen, reverse transcriptase enzyme activity) are used to 'detect' HIV. Many people who are HIV-antibody-positive are negative on co-culture [Michaelis, 1987] or vice-versa [Imagawa, 1989].

Gold Standard

There is no laboratory method that provides direct evidence for the presence of HIV. This would be known as a 'Gold Standard', and is the only way to 'test the tests'. Without this, tests are merely compared against each other, and against the presence of symptoms of AIDS. Robert Gallo was able to find similar antibodies in about 88% of the AIDS patients he studied [Gallo, 1985]. From this he concluded that the antibodies are specific for a new virus which we now call HIV (and that this virus causes AIDS). The true Gold Standard would be to purify particles from breastmilk, and then analyze their protein (antigen) and genetic constituents (RNA in the case of HIV particles). Without this, the connection of all the tests listed above to HIV and to AIDS is purely speculation, perhaps strong correlations confused as causation.

A Gold Standard is an essential part of satisfying Koch's Postulates, a set of logical rules for proving that a pathogen (e.g. HIV) causes a disease (e.g. AIDS). To satisfy them, it is necessary to isolate the pathogen from everyone with the disease (and from nobody who has not been exposed to it), infect an animal with purified pathogen, reproduce the disease in the animal, and isolate the pathogen from it. These postulates have not been satisfied for HIV/AIDS because HIV has never been purified from a single person.

Epidemiology

Some claims that HIV is transmitted in breastmilk are based on comparison of groups of mothers who breastfed versus those who formula fed. Excess rates of transmission are considered to be due to breastfeeding. This argument is flawed because it is impossible to run placebo-controlled trials with breastfeeding; possible differences between mothers who breastfeed and those who formula feed; difficulties determining when infants became infected and; most importantly, the definition of breastfeeding. Coutsooudis [2001] found no increased risk of HIV-transmission from exclusive breastfeeding when feeding practices were separated into exclusive-breastmilk, exclusive-formula and mixed. Mixed feeding had a higher incidence of HIV-positive babies. Other studies allowed mixed feeding in both arms of the study [Nduati, 2000] or studied transmission rates in a population with widespread mixed feeding. Given the significant detrimental effects of formula feeding Coutsooudis [2001] calls into question all recommendations that HIV-positive women formula feed their babies.

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