

Borkow G, Covington CY, Gautam B, Anzala O, **Oyugi J**, Juma M, Abdullah MS. Prevention of Human Immunodeficiency Virus Breastmilk Transmission with Copper Oxide: Proof-of-Concept Study. *Breastfeed Med.* 2011 Aug; 6:165-70.

Abstract

BACKGROUND: Human immunodeficiency virus type 1 (HIV-1) transmission through breastmilk is the chief modality through which HIV-1 is transmitted from HIV-1-infected mothers to their babies in developing countries, where alternative feeding options lack practical feasibility. The development of an approach to inactivate the HIV-1 virions ingested by an infant on a daily basis through breastmilk is thus of critical importance.

METHODS:

Copper has potent virucidal properties. Stoichiometric concentrations of copper ions inactivate the HIV-1 protease, which is essential for viral replication. Cell-free and cell-associated HIV-1 infectivity is inhibited when the virus is exposed to copper oxide in a dose-dependent manner. Passage of high titers of a wide range of HIV-1 isolates, spiked in culture medium, through filters containing copper oxide powder resulted in their deactivation.

RESULTS:

In the current study, we demonstrate that the infectivity of three different HIV-1 isolates, spiked in breastmilk obtained from HIV-1-seronegative donors, or of wild-type isolates found in breastmilk obtained from HIV-1-seropositive donors, is drastically reduced (>98%) when exposed to copper oxide.

CONCLUSIONS:

This study is proof of concept that copper oxide is efficacious against HIV-1 found in breastmilk and serves as the basis for further research aimed at determining the possible effects that copper may have on the nutritional and anti-infective properties of breastmilk. Furthermore, this supports the continuing study of the feasibility of developing a filtering device, such as an "at-the-breast" disposable shield that can be used discreetly and safely by HIV-1-infected mothers during breastfeeding.