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Is breastfeeding an equipoise option in effectively treated HIV-infected mothers in a high-income setting?

Kahlert Christian R.[ab], Aebi-Popp Karoline[c], Bernasconi Enos[d], Martinez de Tejada Begoña[e], Nadal David[f], Paioni Paolo[fg], Rudin Christoph[h], Staehelin Cornelia[c], Wagner Noémie[i], Vernazza Pietro[b]

[a] Children's Hospital of Eastern Switzerland, Infectious Diseases and Hospital Epidemiology, St Gallen, Switzerland
[b] Cantonal Hospital St Gallen, Department of Infectious Diseases and Hospital Epidemiology, St Gallen, Switzerland
[c] Department of Infectious Diseases, Bern University Hospital, University of Bern, Switzerland
[d] Division of Infectious Diseases, Ospedale Regionale di Lugano, Switzerland
[e] Department of Obstetrics and Gynaecology, Faculty of Medicine, University Hospitals of Geneva, Switzerland
[f] Children's Research Center, University Children's Hospital of Zurich, University of Zurich, Switzerland
[g] Division of Infectious Diseases and Hospital Epidemiology, University Children's Hospital Zurich, Switzerland
[h] University Children's Hospital, Basel, Switzerland
[i] Department of Pediatrics, University Hospitals of Geneva, Switzerland

Summary

Combined antiretroviral treatment (cART) has reduced mother-to-child transmission (MTCT) of the human immunodeficiency virus (HIV) to virtually zero in industrialised countries, where strictly bottle feeding is recommended for HIV-infected mothers, and to as low as 0.7% after 12 months in low-resource settings, where breastfeeding is strongly encouraged. Given the theoretically very low risk of transmission by breastfeeding with cART, and the advantages and benefits of breastfeeding, also in industrialised countries, the strong recommendation to HIV-infected mothers to refrain from breastfeeding in this setting may no longer be justified.

We have evaluated risks of breastfeeding for HIV MTCT in the light of accessible cART, the general benefits of breastfeeding, and the women's autonomy to consent to any intervention. As we found no evidence in the literature of HIV MTCT via breastfeeding whilst on effective cART, we identified a situation of clinical equipoise.

We propose how to proceed in Switzerland when HIV-infected women consider breastfeeding. We advocate a shared decision-making process and suggest a list of topics on which to provide unbiased information for the HIV-infected mother to enable her comprehensive understanding of one or the other decision.

Although breastfeeding still should not be actively recommended in Switzerland, any HIV-infected mother, regardless of her geographical and cultural background, who decides to breastfeed should be supported by the best strategy to achieve optimal medical care for both herself and her child. This includes continuous support of cART adherence and regular maternal HIV plasma viral load monitoring.

Keywords: *HIV, mother to child transmission, MTCT, vertical transmission, breast milk, breastfeeding, autonomy, shared decision making, equipoise, Switzerland*

Introduction

Reduction of mother-to-child transmission (MTCT) of the human immunodeficiency virus (HIV) to virtually zero due to implementation of prevention strategies, including most importantly combined antiretroviral treatment (cART) of the mother leading to full suppression of the HIV plasma viral load (pVL) is one of the greatest medical successes in fighting the HIV epidemic [1]. As HIV MTCT occurs in up to 26% [2] after 12 months when breastfeeding mothers are not on cART, HIV-infected mothers in industrialised countries are advised to refrain from breastfeeding. This contrasts with the current recommendation to breastfeed in low-resource settings [3], which is based on the important multiple advantages of maternal milk compared with formula in such areas (e.g., increased risk of diarrhoea and death in infants due to use of unsafe water) [4].

Little is known about the absolute risk of HIV MTCT via breast milk whilst mothers are on cART. Nevertheless, low HIV MTCT figures in low-resource settings, even if HIV-infected mothers do breastfeed (PROMISE study) [5, 6] question whether a recommendation to abstain from breastfeeding in high-income countries is still justified. Re-evaluation is clearly of great importance as significant advantages of breastfeeding are known.

An essential improvement in modern clinical medical practice is consideration of the patient's autonomy when it comes to medical decisions. The concept of the patient's autonomy is based on ethical principles and has only recently been appreciated, as described by Hurst [7]. For the decision on implementation of elective caesarean section in HIV-infected patients, it was recently proposed to con-

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All authors performed the literature research. CK and PV wrote the first version of the manuscript in collaboration with KAP. All authors largely commented in its developmental stages. CK coordinated the process and wrote the following versions in collaboration with PV. DN essentially reviewed and redrafted the manuscript. All authors read and approved the final version.

Correspondence:
Christian R. Kahlert, MD, Ostschweizer Kinderspital, Claudiustrasse 6, CH-9006 St Gallen, christian.kahlert[at]kssg.ch

sider not only the individual risks and benefits but also the autonomy of women [8].

We have evaluated the risks and benefits of breastfeeding, including the implication of ethical principles, for the prevention of HIV MTCT in the setting of accessible cART in Switzerland. We propose how to proceed in Switzerland when HIV-infected women consider breastfeeding. Our evaluation may serve to provide an overall improved counselling of HIV-infected mothers, regardless of their geographical and cultural background.

Why re-evaluate breastfeeding by HIV-infected women?

The current guidelines in Europe, including the Swiss recommendation, discourage HIV-infected mothers from breastfeeding. This is based on data from periods when well-tolerated and efficient cART was not yet available. In the absence of cART, 15 to 30% of vaginally delivered children of HIV-positive mothers acquire HIV, one third during gestation and two thirds during labour [9]. In a randomised controlled trial in cART naïve mothers from Kenya, breastfeeding resulted in an additional 2-year HIV MTCT rate of 16%, and the total cumulative probability of HIV infection in the breastfeeding arm was 37% [10].

Nowadays, improved cART results in full suppression of HIV replication in most infected individuals. This was convincingly evidenced by cessation of molecular HIV evolution in a treated host [11]. The effect of cART – even when suboptimal – has led to a reduction of overall 1-year HIV MTCT in breastfeeding mothers to 4.2% [12]. In the Swiss HIV Cohort Study (SHCS), 96% of appropriately treated individuals achieve full suppression of HIV pVL [13]. Most notably, pregnant HIV-infected women show comparable results [14], which was confirmed in the most recent period of 2012 to 2016 by a total of 229 pregnancies registered in the SHCS, whereof 95.9% women had full suppression of HIV pVL prior to delivery (data on file).

Current recommendations published in 2016 by the World Health Organization (WHO) state that "mothers living with HIV should breastfeed for at least 12 months and may continue breastfeeding for up to 24 months or longer (similar to the general population) while being fully supported for cART adherence" [3]. This pertains to "settings where national authorities have decided that the maternal and child health services will principally promote and support breastfeeding and antiretroviral interventions as the strategy" [15] – that is, in low-resource settings where the reduction of overall child morbidity and mortality is the main driver to recommending breastfeeding by HIV-infected mothers. Many HIV-infected women in Western Europe have emigrated from countries that apply WHO guidelines in this way. As breastfeeding is currently not supported in European countries, this leads to confused mothers.

This is accentuated by social and cultural pressures, which may cause difficulties and even stigmatisation of HIV-infected women who are advised not to breastfeed. Moreover, there are practical and financial reasons why women might opt to breastfeed their infant. These factors may cause additional pressure and personal distress. Importantly, unanswered questions about the arguments not to breastfeed may, in certain circumstances, result in occasional breastfeeding against medical advice [16]. Women may decide not to disclose their decision and disengage from care because of shame or fear of judgement [17]. Breastfeeding in these situations possibly increases the risk of HIV MTCT, for example, when cART adherence difficulties are not identified promptly and dealt with adequately. Additionally, delayed diagnosis of vertical HIV infection and delayed initiation of cART in the offspring may be a consequence.

Finally, there is urgent need to re-evaluate the situation for HIV-infected women with a strong desire to breastfeed in the light of improved effectiveness of cART, based on experiences with the current WHO recommendations for resource-limited settings and recent study results (e.g., the PROMISE study [5, 6], which is discussed below).

Thus, re-evaluation of breastfeeding by HIV-infected mothers is likely to allow for more appropriate support of women in this situation, including an approach of harm reduction counselling [18] for mothers desiring to breastfeed.

Risk of HIV MTCT during breastfeeding whilst on suppressive cART

Upfront, we defined a so-called "optimal scenario" with virtually zero risk of HIV MTCT wherein a pregnant woman is (i) adherent in taking her cART, is (ii) under regular clinical care, and (iii) has a suppressed HIV pVL of <50 RNA copies/ml throughout pregnancy and breastfeeding. We then reviewed the literature to identify cases where HIV MTCT did occur via breastfeeding whilst mothers complied with the "optimal scenario". For the literature search, we used the search term expressions filtered for *publication date from 2009/01/01, core clinical journals*: (i) "mother to child transmission" HIV and (ii) "HIV transmission", additionally filtered to infant: birth–23 months. Moreover, we identified additional literature by a PubMed PICO search [https://pubmedhh.nlm.nih.gov/nlmd/pico/piconew.php] with *population*: pregnancy HIV, *intervention*: prevention, with *comparison* and *outcome* blank). A case of HIV MTCT via breastfeeding despite cART in a mother-child pair is given when the following criteria met: (i) the mother had at least two undetectable pVL results during pregnancy and at delivery, (ii) the child was proven not to have acquired HIV *in utero* or during the peripartum period (negative HIV-RNA in the first month of life), but (iii) subsequently HIV-RNA detection was documented during or after the breastfeeding period.

We were not able to identify in the literature a case of HIV MTCT via breastfeeding in the setting of the optimal scenario. A recent systematic review summarised the literature on HIV MTCT through breastfeeding by mothers on cART [12]. In six studies, cases of postpartum transmission were identified. Nevertheless, none fulfilled abovementioned criteria. In a randomised trial evaluating the difference between a nucleoside reverse transcriptase inhibitor (NRTI) only and a protease inhibitor (PI) plus NRTI regimen in pregnant women, at 6 months postpartum HIV MTCT occurred in a total of eight infants (Mma Bana Study) [19]. Six of the eight infants had acquired HIV *in utero*. Two cases suggested transmission by breastfeeding as the most likely mode of HIV MTCT at 3 months of age. Both mothers of the HIV-infected children started cART with abacavir, zidovudine (AZT) and lamivudine only a

short time before delivery (25 and 97 days, respectively); one mother still had a detectable HIV pVL at delivery and the other mother reportedly had adherence issues. Therefore, these two cases of HIV MTCT via breast milk do not fulfil the criteria for an "optimal scenario" with fully suppressive cART. No HIV RNA was detected in breast milk from either mother at 1 and 3 months after delivery, additionally lowering the likelihood of HIV MTCT through breastfeeding. The long-term follow-up in the same study did not identify additional cases until week 48. This reflects an extremely low risk of HIV MTCT with 0.3% (1 of 275) in the group of breastfeeding HIV-infected mothers who received cART consisting of ritonavir boosted lopinavir, zidovudine and lamivudine [20].

Results from interventional studies and a Cochrane review [20–23] have provided evidence that cART is efficacious in prevention of HIV MTCT by breast milk and have thus informed the current WHO recommendations [3]. HIV MTCT increases once maternal cART is stopped at 6 months in breastfeeding HIV-infected women, which supports the current WHO recommendations of life-long ART for all (WHO option B+) [12]. As recent data from Tanzania suggest, increasing implementation of this strategy is helping to further contribute to the elimination of HIV MTCT [24]. Similarly, the recent PROMISE Study [5, 6] compared two postpartum prevention strategies in breastfed children, maternal cART versus daily single dose nevirapine to the child for 18 months, in over 2400 mother-child pairs. HIV MTCT at ages 6, 9 and 12 months in the maternal cART arm were 0.3% (95% confidence interval [CI] 0.1–0.8), 0.6% (95% CI 0.3–1.3) and 0.7% (95% CI 0.3–1.4), respectively, and not significantly different between the two strategies [5]. Although these results confirm the low risk when cART is implemented, analysis of the HIV RNA for the whole breastfeeding period is currently not yet available to prove or disprove HIV MTCT in the "optimal scenario", i.e., whilst on fully suppressive cART. So far, we only have information from the first week postpartum, when 41% of women on cART had undetectable HIV pVL [5, 6]. Finally, several European countries have reported single cases of breastfeeding women, so far without any case of HIV MTCT [25]. A very recent study from Tanzania did not identify a case of HIV MTCT among 214 mothers who were retained in care and had suppressed pVL [26]. Unfortunately, 18% of the infants were lost to follow-up, transferred, or died before the exclusion of HIV infection.

Our literature review revealing no case of HIV MTCT through breastfeeding in the "optimal scenario" does not provide absolute absence of evidence for transmission risk in that setting. It may therefore be helpful to (i) compare the risk of HIV MTCT via breast milk to other potential HIV transmission situations and (ii) balance the residual risk versus the health benefits of breastfeeding to support a woman's decision for or against breastfeeding on an individual basis. Both points are discussed below.

Comparing the risk of HIV transmission through breastfeeding whilst on cART with other situations

To estimate the risk of HIV MTCT through breastfeeding, we refer to situations where any risk of HIV transmission has been remarkably reduced since introduction of effective cART:

1. The risk of HIV transmission is associated with the HIV pVL.
   - In the case of horizontal transmission [27]
   - After needle stick injury [28]
   - In peripartum MTCT [29]
5. cART is able to fully suppress of HIV RNA in body compartments and fluids including blood, rectal tissue, genital secretions, lymph node tissue, and breast milk [23].
6. HIV transmission is effectively reduced when cART is implemented.
   - No sexual transmission observed in case of an undetectable HIV pVL, even when condoms are not used [30].
   - Although no robust data are available, transmission after needle stick injuries is considered extremely low if the source has undetectable HIV pVL [31]. The Swiss recommendations (FOPH, 2007, bulletin 31, pages 543–555) do not recommend standard PEP but propose expert consultation in such instances.
   - Virtually no HIV MTCT by vaginal birth if mother is under suppressive cART during pregnancy [8, 32].

Hence, available data indicate a very low, unmeasurable risk of transmission whilst on fully suppressive cART. However, it must be emphasised that HIV MTCT through breastfeeding is different in that prolonged potential exposure is possible, with cumulative exposure to significant quantities of milk, potentially containing HIV.

Are there possible additional risks from breastfeeding?

Mastitis may increase the risk of HIV MTCT via breastfeeding, and prolonged exposure to cART present in breast milk is an important consideration as potential cART toxicity from *in-utero* and peripartum exposure is well known. Furthermore, cell-associated HIV could theoretically constitute an additional risk. The following points summarise our reflections on these topics.

- Mastitis – even when subclinical – has been shown to increase HIV load in breast milk in women not under suppressive cART [33]. However, this has not been studied for the "optimal scenario". Moreover, data from the ZVITAMBO trial showed that mastitis was associated with postnatal transmission only when maternal plasma HIV load was elevated [34].
- cART toxicity is well known in exposed children not infected with HIV whose *in-utero* or postpartum exposure to antiretrovirals was associated with persistent decreases in lymphocyte, neutrophil [35] and platelet numbers, as well as an increased risk of transient lactic acidaemia, anaemia and mitochondrial DNA depletion [36]. However, in a recent prospective cohort study, only zidovudine exposure during pregnancy resulted in a higher risk of metabolic adverse events [37]. Most of these reports analysed the use of old NRTI-compounds,

such as zidovudine, and their use as post-exposure prophylaxis for neonates and not exposure through breastfeeding [38]. Exposure to cART by breastfeeding, in general, seems to result in much lower exposure than established paediatric dosing. Protease inhibitor concentrations in breast milk are generally lower compared with NRTIs and non-NRTIs. A systematic review found the maximum total exposure of the child to lamivudine and nevirapine to be 8.4 and 12.5%, respectively, of the established paediatric dose [39]. Obviously, there is a lack of information especially for newer drugs and, in consequence, research on drug levels in breast milk is still urgently needed [38]. Based on what is known, significant cART toxicity seems rather unlikely, but cannot be fully excluded. As safety data are limited, antiretroviral drugs are not licenced for breastfeeding mothers. Regular re-evaluation of this topic remains crucial and research on this should be encouraged. The risk of cART resistance in infants through low level exposure is less of a concern. This risk is substantial when relatively high, but imperfect, levels of antiretrovirals are achieved and high HIV pVL is present. These are the major predictors of antiretroviral resistance [40]. For this reason, it is crucial to rule out HIV infection, as generally recommended in HIV exposed children.

– Breast milk contains many inhibitors of viral replication which may inactivate a large proportion of cell-free virions present in breast milk; infected cells thus play a more significant role than cell-free virus in transmission of HIV via breastfeeding. Therefore, even during efficient antiretroviral therapy, a residual, stable CD4+ T cell-associated reservoir of HIV-1 is persistently present in breast milk [41]. However, for horizontal transmission, large studies have shown that the presence of HIV in secretions does not represent a risk for infection if HIV pVL is suppressed [42, 43]. For breastfeeding, the best available data come from the PROMISE study [5, 6] which was discussed above.

Which are the possible benefits from breastfeeding?

Breastfeeding is generally recommended for all children [44] and is the most natural way to provide nutrition to an infant, besides having health benefits from fostering the contact of mother and child. Depending on the psychological and socio-cultural background, refraining from breastfeeding might be associated with a negative attitude of the mother [16]. The proven health advantages of breastfeeding, irrespective of HIV status, are as follows:

– Breast milk contains several bio-active anti-inflammatory and antimicrobial substances that are beneficial for the child, such as secretory IgA, lactoferrin, lysozyme and others [45]. Some evidence is available for a transfer of HIV-specific antiviral factors (IgA, IgG, lymphocytes) [46].
– Development of the gut microbiota is directly influenced by breastfeeding, for example, through an individualised human milk oligosaccharide composition [47] that may even influence survival in HIV-exposed uninfected children [48].
– Reduced obesity [49] and acute otitis media episodes have been described [50].
– Health outcomes in preterm and low birth weight infants (e.g., growth) are improved [51].
– Hormonal changes during lactation (oxytocin/cortisone release) are considered to have beneficial effects on uterine involution [52].
– Incidence of postpartum depression is lower [53].
– A beneficial role with regard to the future risk to develop breast cancer has been suggested [54].
– Glucose homeostasis is improved and protection against type 2 diabetes [55], in particular after gestational diabetes, has been detected [56].

A recent review summarised both short- and long-term health benefits for both the mother and her child [4]. Although these benefits have not formally been proven in an HIV setting, there are no obvious reasons why they should not hold true in case of the “optimal scenario”.

In summary, comparison of breastfeeding with other situations with the risk of HIV transmission suggests a very low risk of HIV MTCT via breast milk. Balancing the potential risks and benefits of breastfeeding in the “optimal scenario” remains difficult. Most of the risks are suspected on theoretical grounds, and the beneficial values of breastfeeding need to be judged individually. For this reason, the decision should be an individualised one.

Need for shared decision making in the situation of clinical equipoise

Any medical recommendation ought to be based on balancing risks and benefits. Published evidence, if available, provides an obvious distinction of risks and benefits. Nevertheless, when the potential risks and the benefits of an intervention tend towards zero, balancing risks and benefits is extremely challenging, if not impossible. Such a clinical situation is usually defined as clinical equipoise [57].

In a recent review, Johnson et al. argued that it might be ethically acceptable to inform a pregnant HIV-positive woman about the possibility of breastfeeding her child [58]. Since the “optimal scenario” meets the premise of equipoise, we argue that informing HIV-infected mothers fulfilling the ‘optimal scenario’ about the possibility of breastfeeding becomes a clinical necessity. This requirement is strengthened if a basic principle of clinical work is considered, which is not to decide on behalf of the patient but to respect the patient’s autonomy [7]. As recently suggested for the mode of delivery [8], it is vital to protect women’s autonomy regarding their view of infant feeding. Consequently, the decision for or against breastfeeding must follow the process of shared decision making with any woman wishing to breastfeed. This process requires that the HIV-infected mother receives comprehensive and unbiased information that empowers her to understand the risks and benefits of each decision. The healthcare provider’s role in this process is to supply all the required information for the decision-making process in an unbiased manner, and to understand and respect the woman’s preference and autonomy. Ideally, after exchanging this information and discussing all potential risks and benefits, a decision is made that can be shared by all the involved partners. This decision process should take place before delivery. Table 1 summarises the competing arguments. The list can be considered as a minimum set of arguments to be discussed with the HIV-infected mother. Over time,

this list should be adapted or extended, whenever new information becomes available.

Proposal on how to proceed when HIV-infected women consider breastfeeding

If an HIV-infected woman decides to breastfeed after completing the shared decision-making process, she should be medically supported with a nonjudgmental attitude, with the overarching goal of keeping the mother and her child in follow-up. Criteria of the "optimal scenario" are the indispensable prerequisite, as sustained full HIV pVL suppression is the most important risk-minimising factor in HIV MTCT. The treating physicians should be aware of the fact that the "optimal scenario" might not always be a stable condition throughout pregnancy and breastfeeding, but might be threatened by difficulties leading to suboptimal adherence [59, 60], such as postpartum depression or irregular sleep due to the demands of the baby. Thus, the mothers should be encouraged to adhere throughout the breastfeeding period [60] and advised about practical methods to optimise adherence. Breastfeeding may motivate women to remain in care and take their cART to protect their child. This has the potential to reduce maternal loss to medical follow-up as has frequently been observed in women who stopped cART after delivery and did not return [17]. Adherence should be strengthened by all locally available tools (e.g., Medication Event Monitoring System, mobile phone reminder). Regular follow up of treatment during breastfeeding will detect unsuppressed HIV pVL (>50 RNA copies/ml) soon and should result in immediate cessation of breastfeeding and evaluation of drug adherence. After stopping breastfeeding for any reason, HIV pVL testing in the child will follow (relevant points with specifics are summarised in table 2).

Conclusion

Breastfeeding still should not be actively recommended in Switzerland until more robust safety data are available. However, as we were unable to ascertain evidence of HIV MTCT via breastfeeding whilst on effective cART, in the "optimal scenario", and clear reasons to support breastfeeding do exist, we propose no longer rigidly advising HIV-infected mothers against breastfeeding in the "optimal scenario" with a strong wish to breastfeed their children. The woman's autonomy with regard to infant feeding should be respected. When balancing risks and benefits, we identified a situation of clinical equipoise. Thus, we advocate an open discussion with the pregnant women on her infant feeding plans during early pregnancy. In this discussion, a shared decision-making process should take place. We suggest a list of topics on which to provide unbiased information for the HIV-infected mother and to empower

Table 1: Guidance for a shared decision-making process to decide on breastfeeding by HIV-infected mothers fulfilling the "optimal scenario".

1. Requirements	An "optimal scenario" is when the pregnant woman is (i) adherent in taking her cART, is (ii) under regular clinical care, and (iii) has a suppressed HIV pVL of <50 RNA copies/ml throughout pregnancy.
	All the involved healthcare providers should agree on an open, non-judgmental and unbiased approach towards breastfeeding.
	Understand the woman's preference before discussing risks and benefits.
	Discuss arguments for and against breastfeeding including open questions and admit limitations of medical knowledge (see listings under 2 and 3 below).
	Inform the woman that the whole HIV care team accepts whatever the decision is and this will not affect the quality of the HIV management offered to her.
2. List of potential RISKS associated with breastfeeding	HIV transmission to the child cannot be ruled out.
	(i) Transmission through breastfeeding in the range of 0.3–0.9% (6–24 months of breastfeeding) has been observed in the past when women were under effective combined antiretroviral therapy (cART) during pregnancy and the breastfeeding period.
	(ii) There is no formal study evaluating the risk of MTCT by HIV-infected mothers who are under suppressive cART.
	(iii) Even if we are not aware of a single case of MTCT under the "optimal scenario" we cannot exclude the possibility that such a case did or might happen.
	(iv) Even though the risk of transmission may be very low, if it occurs in a single child, the consequences of HIV transmission are lifelong for the child
	Postpartum is a vulnerable period (e.g., irregular sleep, elevated risk for mood disorders) for women with the risk of impaired adherence and consequently increased pVL. In this period particularly, support of adherence to cART is important.
	Longer exposure to maternal antiretroviral drugs; although breast milk concentrations are low, toxicity cannot be absolutely excluded.
	Episodes of mastitis might increase the risk of transmission.
	An increased risk of HIV MTCT has been observed in breastfeeding untreated HIV-infected mothers when breastfeeding was accompanied by solid food (i.e., mixed feeding). There are currently no data to support an additional risk in the "optimal scenario" but it cannot be excluded. Exclusive breastfeeding during the first 4 months is generally recommended in Switzerland.
	The role of cell-associated virus in breast milk as an additional possible risk is not fully understood.
3. List of potential BENEFITS arguing for breastfeeding	Recommendations to breastfeed during the 6 months postpartum exist in many European countries including Switzerland
	Parents consider breastfeeding a simple, easy and free way of providing nutrition to the infant AND/OR psychologically essential for infant care and development.
	Breastfeeding has beneficial effects for the child (though not formally proven for children of HIV-infected mothers), such as:
	(i) The human microbiome is established normally with possible beneficial health consequences; e.g. lower risk to develop allergies, overweight and diabetes.
	(ii) Anti-inflammatory and anti-infective components in breast milk might have beneficial effect for immune-response and immune-tolerance which are important to prevent the development of allergies or infectious diseases.
	Beneficial effects of breastfeeding for the mother include:
	(i) Improved postpartum recovery with breastfeeding helps in the involution of the uterus and reduces postpartum depression.
	(ii) A beneficial role of breastfeeding to reduce the future risk to develop breast cancer and on glucose homeostasis and protection against type 2 diabetes.

cART = combined antiretroviral therapy; HIV = human immunodeficiency virus; MTCT = mother-to-child transmission: pVL = plasma viral load

comprehensive understanding of one or the other decision. Any HIV-infected mother, regardless of her geographical and cultural background, who decides to breastfeed, should be supported by the best strategy to guarantee her and her child's optimal medical care, cART adherence and pVL monitoring during this phase in order to ensure the very best medical outcome for the mother and her child.

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Table 2: Suggested procedures to address breastfeeding in HIV-infected mothers with a strong wish to breastfeed their children.

Prerequisite conditions to minimise HIV MTCT risk ("optimal scenario")	Adherent in taking her combined antiretroviral therapy (cART)
	Suppressed HIV pVL (<50 RNA copies /ml) throughout pregnancy
	Regular follow up of treatment during pregnancy (e.g. every 2–3 months) to ensure maintained suppression of pVL.
Shared decision making	Interdisciplinary process with patient and HIV care providers (including adult HIV specialist, paediatrician and obstetrician/gynaecologist)
	Start as early as possible during pregnancy but mandatory (re)discussion prior to delivery
	For pro and con arguments, see table 1
Follow-up mother and child	Women deciding to breastfeed should be followed up initially monthly during the full breastfeeding period
	Women who breastfeed should contact their obstetricians in case of signs and symptoms of mastitis. The decision to continue or to stop breastfeeding in this situation will be taken individually based on its severity, maternal compliance with cART and antibiotic treatment and the wish of the informed mother. The same holds true for haematemesis and melaena in infants, where breastfeeding is the leading cause.
	HIV pVL (>50 RNA copies/ml) must result in a stop of breastfeeding.
	After any cessation of breastfeeding, the child will have routine diagnostic testing as recommended in HIV-exposed children at month 1, months 4–6, and 18–24 months until maternal antibodies are confirmed negative in the child.

cART = combined antiretroviral therapy; HIV = human immunodeficiency virus; MTCT = mother-to-child transmission: pVL = plasma viral load

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