FORUM ON THE RISKS OF PERICONCEPTIONAL DOLUTEGRAVIR EXPOSURE

SUPPORTED BY GRANTS FROM THE BILL & MELINDA GATES FOUNDATION AND THE PENTA FOUNDATION
FAQS: Dolutegravir and Women of Childbearing Potential

INTERIM CONSIDERATIONS

These frequently asked questions are designed to help provide context and to support public health and clinical decision-making bodies as they balance current potential concerns about the use of DTG in women of childbearing potential against its known benefits.

BACKGROUND

Dolutegravir (DTG) is an integrase inhibitor that offers many advantages for people living with HIV. The World Health Organization (WHO) currently recommends DTG-based regimens as first-line antiretroviral therapy (ART), primarily as a fixed-dose combination of tenofovir/lamivudine/DTG, for people living with HIV [1]. However, recent data from a birth outcomes surveillance study in Botswana identified a possible concern regarding the use of DTG in women of childbearing potential. This is a term used for women who are capable of becoming pregnant; they include women who are using contraception, are single or whose husbands have had vasectomies or are using contraceptives.

Preliminary data from this study suggest that periconceptional use of DTG may cause a small (less than 1%) but significantly increased risk of neural tube defects (NTDs) in infants compared with the risk in women receiving non-DTG regimens or in HIV-negative women. In May 2018, these preliminary findings led WHO, the European Medicines Agency (EMA), the US Food and Drug Administration (FDA) and other organizations and guideline panels to issue a drug safety caution about the use of DTG in this population [2-7]; this is pending further evidence from Botswana and other studies that is anticipated in April/May 2019. The purpose of a drug safety caution is to identify evidence of a specific risk, rather than to contextualize that potential risk against relative benefits.

1. WHAT ARE THE ADVANTAGES OF A DTG-BASED ART REGIMEN OVER AN Efavirenz (EFV)-BASED ART REGIMEN?

• In the SINGLE study, which compared a DTG-based regimen with an EFV-based ART regimen [8]:
  - The DTG-based regimen was better tolerated than the EFV-based regimen, with lower reported discontinuation rates due to adverse events (4% versus 14%).
  - The DTG-based regimen had better rates of viral suppression (HIV RNA <50 copies/mL) than the EFV-based regimen, which persisted through week 144 of therapy. This difference was driven by a lower rate of drug discontinuation due to adverse effects with DTG than with EFV-based ART.
  - CD4 cell count increase was greater with the DTG-based regimen than the EFV-based regimen.

• Similar improved tolerability with DTG has been observed in studies comparing DTG with darunavir-ritonavir, atazanavir-ritonavir and raltegravir-based ART [9-12].

• Viral load decrease is much more rapid with integrase inhibitor-based regimens, such as DTG, than with regimens with drugs from other antiretroviral drug classes, including non-nucleoside reverse transcriptase inhibitor (NNRTI) drugs, such as EFV. This effect can be important for some populations, including women who become infected while pregnant or who first present in late pregnancy and need rapid viral suppression in order to decrease maternal to child transmission [13].

• Integrase inhibitors have a higher barrier to drug resistance than NNRTI drugs [14], so patients are less likely to develop HIV drug resistance and thus less likely to transmit drug-resistant HIV infection to their infants or pass on drug-resistant strains to sexual partners. In areas where rates of transmitted NNRTI resistance are already high (10% or higher), DTG-based ART is expected to achieve virologic suppression better than EFV-based ART [15]. A 2017 WHO report found that half of the 11 surveyed countries had levels of NNRTI pre-treatment resistance above 10% [16].

• DTG-based regimens are expected to be active against HIV-2 infections [17], which may coexist with HIV-1 infection in West and Central Africa. Current EFV-based regimens are not fully active against HIV-2 [18].

• DTG is also expected to play an important role as a second-line therapy for patients who fail first-line therapy with NNRTI-based ART [19-21] as DTG is better tolerated and less expensive than the previously recommended protease inhibitor-based second-line regimens.
• Further evidence about the relative effects of DTG compared with low-dose (400mg) EFV-based ART as first-line regimens in an African setting is being provided by the NAMSAL trial, which was presented at the HIV Drug Therapy Glasgow 2018 meeting in October.

• The cost of DTG-based regimens is currently similar to or lower than EFV-based regimens. It is expected that, as manufacturing capacity and competition increases, the cost of DTG-based regimens may drop further [22].

2. WHAT ARE THE DATA ABOUT PERICONCEPTIONAL USE OF DTG AND NEURAL TUBE DEFECTS THAT LED TO

• In 2014, with support from the US National Institute of Child Health and Human Development, the Tsepamo study was launched in Botswana to assess the risk of NTDs (such as spina bifida or anencephaly) with periconceptional EFV use. This was based on data in monkeys, which suggested that in utero EFV exposure might be associated with central nervous system defects. When DTG-based ART was implemented as the preferred first-line ART in Botswana in 2016, the use of this regimen before and during pregnancy was also captured through the surveillance system. The study involved assessment of all births, including live births and stillbirths, to HIV-positive and HIV-negative women at eight maternity sites, covering 45% of births occurring in Botswana. All infants at these sites underwent surface examination by trained nurse midwives for external birth defects, including NTDs. Drug exposures before and during pregnancy were recorded by review of the mother’s antenatal care records.

• In preparation for the WHO guidelines development meeting in May 2018, the Tsepamo investigators were asked to conduct an interim analysis of their findings related to birth outcomes with DTG use before and during pregnancy. This interim analysis revealed an unexpected increased risk of NTDs among infants born to women who were receiving DTG-based regimens at the time of conception (4/426, 0.94%, 95% CI 0.37-2.4%), but not in those receiving non-DTG ART regimens at the time of conception (14/11,300, 0.12%, 95% CI 0.07-0.21%) [23]. The increased risk was also present in comparison with the rate of NTDs among HIV-negative women (61/66,057, 0.09%, 95% CI 0.07-0.12%).

• The Tsepamo study data were updated on 1 May 2018 to include 596 births to women receiving DTG regimens at conception. No additional NTDs were reported in women receiving DTG at conception, bringing the interim reported rate to 4/596, 0.67% (95% CI 0.26-1.7%) [24].

• The four defects reported after periconceptional DTG exposure include one case each of anencephaly, lumbosacral meningomyelocele (also referred to as spina bifida), iniencephaly and frontonasal encephalocele. Anencephaly and meningomyelocele reflect failure of closure of the embryonic neural tube in the first four weeks of gestation and are always classified as NTDs; however, some experts think that niencephaly and encephalocele occur soon after neural tube closure and thus might have a different pathogenesis. Sparse data exist to determine if this distinction in pathogenesis is embryologically correct or to conclude whether these types of birth defects have similar or dissimilar risk factors. In the Tsepamo study, all four defects were considered to be NTDs and were analysed as a group.

• The geographic occurrence of the defects in Botswana, as well as potential confounding maternal factors, were examined, but no specific patterns were detected.

3. WHAT ADDITIONAL DATA ARE BEING COLLECTED AND WHEN WILL AN ANSWER ABOUT THE POTENTIAL RISK OF NTDs WITH PERICONCEPTIONAL USE OF DTG BE AVAILABLE?

• Although the currently known data from the Tsepamo study are concerning, it is possible that the observed increase in NTDs reflects random clustering of a relatively rare event. If more NTD cases are seen with periconceptional DTG use, the signal may be confirmed, with a clearer estimate of magnitude. Many more exposures without defects are needed to rule out an increase of NTDs, because the background prevalence of NTDs is very low (about 0.1%). It is estimated that approximately 2,000 periconceptional exposures are needed to be able to rule out a three-fold increase in a defect with a background prevalence of 0.1% [25].
The Tsepamo study has expanded from eight to 18 sites, covering 72% of births in Botswana. The next in-depth assessment of the Tsepamo study will occur in April 2019; approximately 1,200 women with periconceptional DTG exposure are expected to have delivered at Tsepamo sites by that time.

The Botswana Ministry of Health, with support from US Centers for Disease Control and Prevention, has expanded birth defect surveillance in Botswana at sites outside of the Tsepamo study. With this expanded surveillance added to the existing Tsepamo programme, birth defect data collection will cover more than 90% of births in Botswana by November 2018.

DTG has been implemented on a more limited basis in several other countries, including Kenya, Uganda, Brazil and Ukraine. Pregnancies occurring among women on DTG in these countries are being tracked. However, data outside of the Tsepamo study from Botswana and other countries will have to be assessed carefully to assure that the full denominator of exposures has been included and that a biased sample is not obtained because of differential reporting of infants with adverse birth outcomes. Understanding the background population rate of birth defects in each country is also important to aid in interpretation.

The Antiretroviral Pregnancy Registry, an international registry supported by antiretroviral drug manufacturers and administered by an independent advisory board, contains limited numbers of cases of DTG-exposed pregnancies to date. As of the 31 January 2018 cut-off date, 161 cases with any first trimester exposure to DTG had been reported, with five birth defects reported. Of these, 121 had exposure at conception and 40 initiated exposure later in the first trimester. Among those cases, no NTDs or central nervous system defects were identified. Data reported up to 31 July 2018 are currently under review and will be reported as soon as possible.

Databases that rely on passive retrospective reporting of NTD cases after the birth of the infant will not have the utility to add to the current data due to potential selectivity bias and lack of denominators.

In the US, which has been implementing DTG since approval in 2013, an effort is underway to match state birth defect registries with HIV-exposed birth registries to identify birth defects by timing and category of ARV exposure. Data from this effort are expected in 2019.

Surveillance of all births for defects similar to the Tsepamo study has been implemented at several facilities in Uganda and Malawi, covering more than 60,000 births per year. These programmes will provide additional data on the safety of DTG and other antiretroviral agents as they are implemented in these countries.

Two academic groups have modelled outcomes in women and children with implementation of DTG-based ART versus EFV-based ART in women of childbearing potential [26,27]. These models are undergoing peer review and being refined. Both models indicate that providing DTG-based ART for all HIV-positive women, including those of childbearing potential, results in lower mortality than providing them with EFV-based ART. They also indicate that the reduction in mortality significantly exceeds the potential increase in neonatal mortality if the increased risk of an NTD is confirmed.

4. WHAT ARE THE CONTRACEPTIVE OPTIONS THAT SHOULD BE OFFERED TO WOMEN OF CHILDBEARING POTENTIAL, INCLUDING THOSE WHO WANT TO TAKE DTG REGIMENS?

Concerns about potential teratogenic effects of antiretrovirals underscore the critical importance of women’s access to contraception.

Women should have access to a full range of contraceptive options to allow them to plan pregnancies when they desire, regardless of their HIV status or their choice of ART regimen. Contraceptive options include condoms, injectable agents, such as Depo-Provera and Sayana Press, oral contraceptive pills and long-acting agents, such as implants and intrauterine devices. Access to a range of options is important as it is correlated with an increase in contraceptive use among women seeking it [28]. Ideally, the full range of options would be available in the ART clinic, but if not, counselling should be provided and referrals should be facilitated for women to access their desired method. Reducing the unmet need for family planning should be promoted as part of quality HIV and healthcare services.

Metabolic pathways and limited pharmacokinetic data do not suggest a significant interaction between DTG regimens and hormonal contraceptives that would affect contraceptive efficacy [29].
5. WHAT IS THE KEY FEEDBACK FROM WOMEN LIVING WITH HIV?

- Women living with HIV (WLHIV) have strongly expressed the importance of ensuring a woman’s right to make her own informed choice among ART regimen options. A forum of women living with HIV organized by AfroCAB in Kigali, Rwanda, in July 2018 provided narrative evidence of the enhanced tolerability of DTG over EFV and emphasized the importance of WLHIV being involved in discussions and decisions regarding their treatment [30].

- Women from that forum called for countries to ensure availability of DTG-based ART for all HIV-positive individuals, regardless of gender or reproductive capability, allowing women to make a choice regarding use of DTG after receiving counselling regarding benefits and potential risks. They also made a strong call for integration of sexual and reproductive health services into HIV care for all WLHIV, regardless of which ART regimen they choose [31].

6. WHAT IS THE BOTTOM LINE?

- It is important to recognize that the background rate of NTDs in the absence of DTG (and in the general population) is not zero; one in every 1,000 newborns may be expected to have an NTD. Given the current estimate of risk from the Tsepamo study, periconceptional DTG may increase this risk from the background rate of one infant with an NTD per 1,000 births to seven per 1,000 births.

- While the global community hopes that the expected data described above will lead to a definitive answer regarding the risk of periconceptional use of DTG, it is possible that uncertainty and the cautionary guidance regarding DTG for women of childbearing potential may persist beyond April/May 2019.

- As evidence emerges, clinical and public health decision making about the choice of ART regimen for women who may become pregnant will have to balance potential risks of DTG against its potential benefits. Consideration of risk should include current lack of certainty of the risk of an NTD with periconceptional DTG exposure. Consideration of benefits should include the rapid decline in viral load and excellent viral efficacy of DTG along with its better tolerability profile. In addition, a high geographic prevalence of NNRTI resistance would make an EFV-based ART regimen significantly less effective in treating HIV and preventing transmission. Poorly treated maternal HIV could affect a woman’s health and her quality of life, and could lead to other negative birth outcomes, such as prematurity and an HIV-positive baby.

- WHO has affirmed the importance of a woman-centred approach to DTG. Women will need support to weigh the risks and benefits in the context of their lives, including their own risks of pregnancy and side-effects experienced on other regimens. Even if some increase in risk of NTDs is confirmed, it may be reasonable for individual women to choose DTG, including women who are unable to access, or choose not to use, hormonal or other long-acting contraception.

Note: This document was developed in November 2018 following the forum on the risks of periconceptional dolutegravir exposure, supported by grants from the Bill & Melinda Gates Foundation and the PENTA Foundation. It will be updated as new data become available.
REFERENCES


ABOUT THE FORUM ON THE RISKS OF PERICONCEPTIONAL DOLUTEGRAVIR EXPOSURE

Over the past few years, through the efforts of multiple stakeholders and government leadership, antiretroviral regimens containing dolutegravir (DTG) have become accessible to the vast majority of people living with HIV (PLHIV) throughout the world. Plans to transition most PLHIV to DTG-containing regimens has brought with them the promise of a more efficacious, safe and durable regimen for individuals, as well as the achievement of epidemic control through community levels of viral suppression. Data from the Tsepamo birth defect surveillance study in Botswana suggests that periconceptional use of DTG may be associated with a small (less than 1%) but significantly increased risk of neural tube defects (NTDs) in infants compared with the risk in women receiving non-DTG regimens or among HIV-negative women. In response to this data, HIV treatment guidelines groups from around the world have made recommendations on the potential safety risks of periconceptional DTG exposure.

This advice is dependent on further data becoming available. Unless these data are collected swiftly, comprehensively and in an epidemiologically robust manner, the decision to roll out DTG-based antiretroviral therapy (ART) or not on a global basis could be delayed and/or limited. Using this as an example, the IAS convened a high-level group of experts to gather and discuss data quality, data interpretation and appropriate messaging of the risks and benefits of administering ART, such as DTG, to HIV-positive women of childbearing age. This effort should be considered complementary to other efforts presently being undertaken by the WHO Advisory Committee on the Safety of Medical Products, the WHO guidelines processes, other regulatory agencies and drug manufacturers. It will be an academic exercise whose outputs and process might be applied to any drug used in pregnancy and inform regulators responsible for pharmacovigilance.

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