Antiretrovirals during pregnancy

CN Mnyani

18 November 2017
Outline

• Current guidelines

• ‘The old...’
  o EFV
  o TDF

• The new...
  o ‘Newer’ ARV agents

• And the unknown...
SA guidelines 2015
SA guidelines

• Since January 2015, all HIV-infected pregnant and breastfeeding women initiated on an EFV-based FDC

• TDF+3TC (FTC)+EFV

• Regardless of CD4 count, WHO stage or infant feeding practice

• FDC continued for life once started
SA Clinician’s Society guidelines

<table>
<thead>
<tr>
<th>Options</th>
<th>Preferred</th>
<th>Alternative</th>
<th>One of</th>
</tr>
</thead>
<tbody>
<tr>
<td>NRTI backbone</td>
<td>TDF + FTC/3TC</td>
<td>ABC† + 3TC</td>
<td>–</td>
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<tr>
<td></td>
<td>–</td>
<td>AZT‡ + 3TC</td>
<td>–</td>
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<td></td>
<td>–</td>
<td>d4T§ + 3TC</td>
<td>–</td>
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<tr>
<td>Third drug</td>
<td>–</td>
<td>–</td>
<td>EFV</td>
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<td></td>
<td>–</td>
<td>–</td>
<td>DTG</td>
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<td></td>
<td>–</td>
<td>–</td>
<td>RPV†</td>
</tr>
</tbody>
</table>

NRTI, nucleoside reverse transcriptase inhibitor; tenofovir; FTC, emtricitabine; 3TC, lamivudine; ABC, abacavir; AZT, zidovudine; d4T, stavudine; EFV, efavirenz; DTG, dolutegravir; RPV, rilpivirine.

†, If creatinine clearance < 50 mL/min; ‡, Only if both TDF and ABC contraindicated or unavailable AND haemoglobin > 8 g/dL; §, Only for short-term use in patients with contraindications to all other NRTIs – we advise against using d4T for longer than 3 months; ††, Only if VL < 100 000 copies/mL.
SA guidelines

Second-line regimen

Failing on a TDF-based 1st line regimen
• AZT + 3TC + LPV/r
• AZT + TDF + 3TC + LPV/r (4 drugs if HBV co-infected)

Failing on a d4T or AZT-based 1st line regimen
• TDF + 3TC (or FTC) + LPV/r

• Dyslipidaemia or diarrhoea associated with LPV/r switch LPV/r to ATV/r  (ATV/r dose adjustment in pregnancy if using with TDF)
SA guidelines

Threshold for treatment failure:

- VL>1000, adherence counselling, repeat VL in 1 month

- 2\textsuperscript{nd} VL undetectable or reduction in VL $\geq 1$ log (10-fold), continue existing regimen

- VL decrease <1 log or increased, switch to 2\textsuperscript{nd} line therapy
SA guidelines

- **Retesting** of pregnant and postpartum women who initially test HIV negative
WHO guidelines 2015
WHO guidelines 2015

**Recommendation**

- ART should be initiated among all adults with HIV regardless of WHO clinical stage and at any CD4 cell count (strong recommendation, moderate-quality evidence).
  - As a priority, ART should be initiated among all adults with severe or advanced HIV clinical disease (WHO clinical stage 3 or 4) and adults with CD4 count ≤350 cells/mm³ (strong recommendation, moderate-quality evidence).
Rationale

- Increasing evidence that untreated HIV infection may be associated with:
  - ...development of several non-AIDS-defining conditions (CVD, kidney and liver disease, several types of cancer and neurocognitive disorders)
  - ...initiating ART earlier reduces such events and improves survival
Initiation of Antiretroviral Therapy in Early Asymptomatic HIV Infection

The INSIGHT START Study Group

The NEW ENGLAND JOURNAL OF MEDICINE

This article was published on July 20, 2015, at NEJM.org.

DOI: 10.1056/NEJMoa1506816

(START: Strategic Timing of Antiretroviral Treatment)
A Trial of Early Antiretrovirals and Isoniazid Preventive Therapy in Africa

The TEMPRANO ANRS 12136 Study Group

CASE REPORT

Delayed presentation and diagnosis of metastatic hepatocellular carcinoma in pregnancy

C N Mnyani, BA, MB ChB, FCOG (SA); J C Hull, MB BCH, MRCOG, FCOG (SA), DTM&H; M B Mbakaza, MB ChB, FC Rad Diag (SA); A O A Krim, MB ChB, FC Rad Diag (SA); E Nicolaou, MD, FCOG (SA), Dip Fet Med

Fig. 1. A CT scan of the chest (coronal view), showing bilateral cannon ball lesions (white lesions) in the lung fields (CT = computed tomography).

Fig. 2. A CT scan of the abdomen (coronal view), showing a large mass in the right hepatic lobe and spleen. The vascular mass occupies the whole of the right lobe, where dense and hypodense areas are seen within the liver.
Metastatic HCC in pregnancy

- 30 yo P1G2
- CD4 183; FDC initiated at 23 weeks
- Presented at 32 weeks with preeclampsia, and respiratory symptoms
- Initial $D_x$ of PTB
- Further investigations – metastatic HCC
WHO guidelines 2015

Increasing evidence to support earlier ART initiation among all adults as described in the previous section, as well as widespread uptake of option B+ and emerging programme data on the success of option B+ in practice, all support a revised recommendation in 2015 that all pregnant and breastfeeding women living with HIV should initiate ART and remain on lifelong treatment regardless of clinical or CD4 stage of disease. As a result, option B is no longer relevant.
Recommendation

ART should be initiated in all pregnant and breastfeeding women living with HIV regardless of WHO clinical stage and at any CD4 cell count and continued lifelong (strong recommendation, moderate-quality evidence).

WHO guidelines 2016

- Recommendation applies to breastfeeding and non-breastfeeding populations

- Health benefits of universal ART for pregnant and breastfeeding women outweigh potential harm

- Health benefits – immunological and clinical
WHO guidelines 2016

Pregnant or breastfeeding women

Preferred 1\textsuperscript{st} line regimen
\begin{itemize}
\item TDF + 3TC (or FTC) + EFV
\end{itemize}

Alternative 1\textsuperscript{st} line regimens
\begin{itemize}
\item AZT + 3TC + EFV (or NVP) \xmark
\item TDF + 3TC (or FTC) + NVP \xmark
\end{itemize}
WHO guidelines 2016

- ABC or boosted PIs (ATV/r, DRV/r, LPV/r) in special circumstances

- Safety and efficacy data on use of dolutegravir (DTG) and EFV$_{400}$ in pregnant women not yet available (…then)
WHO guidelines 2016

Pregnant or breastfeeding women

Preferred 2\textsuperscript{nd} line regimen
- 2 NRTIs + ATV/r or LPV/r

Alternative 2\textsuperscript{nd} line regimen
- 2 NRTIs + DRV/r

(similar to adults and adolescents)
British HIV Association guidelines for the management of HIV infection in pregnant women 2012
(2014 interim review)

*HIV Medicine* (2014), 15 (Suppl. 4), 1–77

To be updated in 2017
British guidelines

• Women conceiving on an effective cART – continue regimen **even if it contains EFV** or does not contain AZT

**Treatment naïve**

• Acceptable backbones:
  - AZT+3TC
  - TDF+FTC
  - ABC+3TC
British guidelines

- Recommended 3<sup>rd</sup> agent:
  - EFV, NVP (CD4 <250) or a boosted PI

- No routine dose alterations recommended during pregnancy if ARVs used at adult licensed doses

- Consider 3<sup>rd</sup> T therapeutic dose monitoring if combining TDF and ATV/r
British guidelines

Treatment naïve presenting after 28 weeks

- If VL unknown or > 100 000, a 3 or 4 drug regimen that includes raltegravir is suggested

Untreated presenting intrapartum:
- Stat dose of NVP; commence FDC containing raltegravir
- IV AZT during labour and delivery
British guidelines

• **VL monitoring** during pregnancy, at 36 weeks and at delivery

• **If not suppressed at 36 weeks,**
  - Adherence counselling
  - Resistance test if appropriate
  - Consider therapeutic drug monitoring
  - Optimize to best regimen
  - Consider intensification
Recommendations for Use of Antiretroviral Drugs in Pregnant HIV-1-Infected Women for Maternal Health and Interventions to Reduce Perinatal HIV Transmission in the United States

Developed by the HHS Panel on Treatment of HIV-Infected Pregnant Women and Prevention of Perinatal Transmission—A Working Group of the Office of AIDS Research Advisory Council (OARAC)

2016 update
US guidelines

- ART should be initiated as early in pregnancy as possible
- ART during pregnancy generally does not increase the risk of birth defects
- No restriction on EFV use before 8 weeks’ gestation
US guidelines

• Women who become pregnant on suppressive EFV-containing regimens should continue their current regimens

• Safety and PK data on tenofovir alafenamide use in pregnancy insufficient to recommend for ARV-naïve women

• AZT monotherapy during pregnancy no longer recommended
Recommendations for Use of Antiretroviral Drugs in Pregnant HIV-1-Infected Women for Maternal Health and Interventions to Reduce Perinatal HIV Transmission in the United States

19 October 2017 update
US guidelines

- Continues to recommend TDF as part of 1st line therapy and AZT as a 2nd-line agent for use in ART-naïve pregnant women

- Based on limited but increasing experience with use in pregnancy, dolutegravir (DTG) now classified as an alternative agent for ART-naïve pregnant women
‘The old...’
Safety of EFV in pregnancy

• Previous concerns about risk of teratogenicity with use in the 1\textsuperscript{st} trimester

• Evidence was based on animal studies and retrospective case reports of neural tube defects in infants exposed to EFV in utero

✿ … data from large observational studies don’t show an increased risk of neural tube defects with EFV use in all trimesters of pregnancy
Safety of EFV in pregnancy

WHO guidance based on available data and programmatic experience:

- EFV use in early pregnancy not associated with increased birth defects or other significant toxicities.
Safety of efavirenz in the first trimester of pregnancy: an updated systematic review and meta-analysis

Nathan Ford\textsuperscript{a}, Lynne Mofenson\textsuperscript{b}, Zara Shubber\textsuperscript{c}, Alexandra Calmy\textsuperscript{d,e}, Isabelle Andrieux-Meyer\textsuperscript{c}, Marco Vitoria\textsuperscript{a}, Nathan Shaffer\textsuperscript{a} and Françoise Renaud\textsuperscript{a}

AIDS 2014, 28 (Suppl 2):S123–S131

Discussion: This updated analysis found no evidence of an increased risk of overall or central nervous system congenital anomalies associated with first-trimester exposure to efavirenz, similar to previous systematic reviews. This review contributed to the evidence base for the revised 2013 WHO guidelines on antiretroviral therapy, which
EFV 400mg

- WHO 2016 guidelines recommend EFV$_{400}$ as alternative 1$^{\text{st}}$-line drug, but...

- with a disclaimer that no data exist on its use at this dose during the 3$^{\text{rd}}$ trimester of pregnancy

- PK study of EFV$_{400}$

- Open-label, multicentre, conducted in UK and Uganda
EFV 400mg

- 25 pregnant women receiving TDF, FTC and EFV 600 mg with an undetectable VL (<50)
  - Switched to TDF/FTC/EFV400

- Baseline CD4 561 (range 152 to 882)

- **Results:** lower drug concentrations in the 3rd T, compared with post-partum, but within adequate ranges

- ... remained virally suppressed, with no perinatal transmission

Boffito M et al. IAS 2017. 23–26 July 2017
EFV 400mg

BUT...

- “Evidence for efficacy in pregnancy at the lower dose and with TB co-treatment (for which a PK study is ongoing) are needed for an unrestricted WHO recommendation”
Safety of TDF in pregnancy

Concerns about...

- Congenital abnormalities
- Growth restriction
- Loss of bone mineral density (maternal and fetal)
- Low birth weight
- Preterm delivery
- Pregnancy losses
Safety of Tenofovir Disoproxil Fumarate-Based Antiretroviral Therapy Regimens in Pregnancy for HIV-Infected Women and Their Infants: A Systematic Review and Meta-Analysis.

METHODS: We conducted a systematic review of studies published between January 1980 and January 2017 that compared adverse outcomes in HIV-infected women receiving TDF- vs. non-TDF-based ART during pregnancy. The relative risk for associations was pooled using a fixed-effects model.

CONCLUSIONS: TDF-based ART in pregnancy appears generally safe for women and their infants. However, data remain limited and further studies are needed, particularly to assess neonatal mortality and infant growth/bone effects.
Conclusions – TDF-based ART in pregnancy

No evidence of increased risk of:

- Congenital anomalies
- Maternal and infant adverse outcomes
- Pregnancy loss or miscarriage
- Small for gestational age
- Low birth weight
- Infant mortality at age >14 days
Conclusions – TDF-based ART in pregnancy

Data limited and inconclusive evidence on:

• Effects of in utero TDF exposure on bone and long-term growth

• Neonatal deaths <14 days in very preterm (<14 weeks) infants
Experts disagree with controversial BMJ support for older HIV drugs in pregnancy

1 October 2017. Related: Special reports, Women’s health, PMTCT and maternal health.

• US Panel and the British HIV Association:
  
  – Do not support BMJ Rapid recommendations favouring a AZT- and 3TC-based ART regimen over one that includes TDF and FTC in pregnant women
The controversy...

On 21 September 2017, BMJ Open published a controversial analysis and accompanying clinical practice guideline on ART in HIV positive women concluding with low certainty evidence that: “tenofovir/emtricitabine is likely to increase stillbirth/early neonatal death and early premature delivery compared with zidovudine/lamivudine”. [1, 2]

- “We are the primary authors of the PROMISE study cited as the evidence for the recommendation in this paper; we disagree with the final conclusion based on our data.”
The new...
Safety of integrase inhibitors (then...)

• Lack of safety data on integrase inhibitor (raltegravir and dolutegravir) use during pregnancy and breastfeeding

• Some experience with raltegravir – standard dose of 400mg 12 hourly

• Very limited with dolutegravir...
Safety of integrase inhibitors

- No published safety or efficacy data on outcomes of dolutegravir use during pregnancy

- **Calcium or iron supplements** (commonly used in pregnancy) could significantly **reduce dolutegravir drug levels**

- Transaminases need to be monitored
Safety of integrase inhibitors

“In the absence of well-controlled studies in pregnant women, dolutegravir and raltegravir should be used only if the perceived benefits outweigh the risk.”

World Health Organization 2016
HIV/AIDS

Transition to the use of dolutegravir

Q&A - 21 September 2017

- Findings from Botswana (has provided DTG to pregnant women for more than 1 year)

- Retrospectively collected data from more than 5 000 women, 16% of whom were receiving DTG regimens
DTG use in pregnancy

- **Birth outcomes** (SB, NND, PTB, and SGA) **do not differ** between women receiving EFV-based therapy and those receiving DTG-based therapy.

- Also **no excess of congenital anomalies** among infants born to women taking DTG.

- Relatively few of these women started DTG in the first trimester.
DTG use in pregnancy

Results from clinical trial networks:

• Have assessed DTG safety and pharmacokinetics in pregnant women

• DTG was well-tolerated and reached levels expected to achieve HIV suppression
OBSTETRICS

Integrase inhibitors in late pregnancy and rapid HIV viral load reduction

Lisa Rahangdale, MD, MPH; Jordan Cates, MSPH; JoNeIl Potter, PhD; Martina L. Badell, MD;
Dominika Seidman, MD; Emily S. Miller, MD, MPH; Jenell S. Coleman, MD, MPH;
Gweneth B. Lazenby, MD, MSCR; Judy Levison, MD; William R. Short, MD, MPH; Sigal Yawetz, MD;
Andrea Ciaranello, MD, MPH; Elizabeth Livingston, MD; Lunthita Duthely, EdD, MS; Bassam H. Rimawi, MD;
Jean R. Anderson, MD; Elizabeth M. Stringer, MD, HOPES (HIV OB Pregnancy Education Study) Group

MARCH 2016 American Journal of Obstetrics & Gynecology
Study design

• Retrospective cohort study of pregnant HIV-infected women in 11 centres in the US

• Study period: 2009 – 2015

• Included 101 women who • **initiated ART**, • **intensified their regimen**, or • **switched** to a new regimen due to detectable viraemia (HIV RNA >40 copies/ml) at ≥ 20 weeks gestation
Results and conclusion

• Median VL at time of ART intervention was 16,030 copies/ml (IQR: 3,370 – 46,271)

• Found rapid viral load reduction with integrase inhibitor-containing regimen

• Limitations: retrospective study; small sample size
Discussion

• Raltegravir – twice-daily dosing

  o RCT (excl. pregnant women) looking at once-daily dosing (800mg)

    o Longer time to viral suppression esp. with VL > 100 000 or CD4 <200 at baseline

• Study conclusion then: Insufficient data to recommend dolutegravir and elvitegravir (once-daily dosing) use in pregnancy
Lowered Rilpivirine Exposure During the Third Trimester of Pregnancy in Human Immunodeficiency Virus Type 1–Infected Women

Stein Schalkwijk, Angela Colbers, Deborah Konopnicki, Andrea Gingelmaier, John Lambert, Marchina van der Ende, José Moltó, David Burger, for the Pharmacokinetics of newly developed antiretroviral agents in HIV-infected pregnant women (PANNA) Network

Clinical Infectious Diseases, Volume 65, Issue 8, 15 October 2017, Pages 1335–1341,

- Non-randomised, open-label, multicentre, phase 4 study
- 16 subjects
Rilpivirine use in pregnancy

- Rilpivirine exposure substantially lowered during late pregnancy, BUT…

- Virologic suppression maintained; no perinatal transmission

- …rilpivirine 25 mg daily may be an alternative option for pregnant women who are virologically suppressed…
Rilpivirine use in pregnancy

• …in settings where therapeutic drug monitoring and/or close viral load monitoring are feasible to detect suboptimal antiretroviral therapy

Rilpivirine (2\textsuperscript{nd} generation NNRTI)
• …cannot be used with TB treatment and cannot be initiated with VL >100 000
PrEP use during pregnancy
Southern African guidelines on the safe use of pre-exposure prophylaxis in persons at risk of acquiring HIV-1 infection

S Afr J HIV Med. 2016;17(1),

Data on safety of PrEP during pregnancy limited… clinician to discuss potential risks and benefits of PrEP initiation or maintenance during pregnancy
National Policy on HIV Pre-exposure Prophylaxis (PrEP) and Test and Treat (T&T)

Final Draft - 5 May 2016

No mention of pregnancy
• Risks, benefits and alternatives of continuing PrEP during pregnancy and breastfeeding should be discussed

• **Further research is needed** to fully evaluate PrEP use during pregnancy and breastfeeding
PrEP

• Data from pharmacokinetic studies:

  - ~ 20 days of PrEP needed before achieving full protection for vaginal intercourse

  - Lead-time required to achieve steady state levels of TDF in blood and tissues
PrEP

PrEP may be discontinued 28 days after the last potential exposure to HIV-infected fluids

- .............if no continuing substantial risk for acquiring HIV infection
Commentary

Offering pre-exposure prophylaxis for HIV prevention to pregnant and postpartum women: a clinical approach

Dominika L Seidman, Shannon Weber and Deborah Cohan

*Corresponding author: Dominika L Seidman, Obstetrics, Gynecology & Reproductive Sciences, University of California San Francisco, 1001 Potrero Ave, Ward 6D, 94110, San Francisco, CA, USA, 011.415.206.3030, Dominika.seidman@ucsf.edu
Perinatal transmission
No Perinatal HIV-1 Transmission From Women With Effective Antiretroviral Therapy Starting Before Conception

Laurent Mandelbrot, Roland Tubiana, Jerome Le Chenadec, Catherine Dollfus, Albert Faye, Emmanuelle Pannier, Sophie Matheron, Marie-Aude Khuong, Valerie Garrait, Veronique Belquet, Alain Devida, Alain Berrebi, Christine Allisy, Christophe Elleau, Cedric Arvieux, Christine Rouzioux, Josiane Warszawski, and Stéphane Blanche, for the ANRS-EPF Study Group
Background

- The French Perinatal Cohort: an ongoing, prospective, observational study involving 90 perinatal centres in France

- 8075 HIV-infected mother/infant pairs included from 2000 to 2011

- Perinatal transmission analysed according to maternal VL at delivery and timing of ART initiation

(Mandelbrot L, et al. 2015 *CID*)
Results

- **80.4%** had prenatal HIV diagnosis

- **VL <50 copies/ml at delivery:**

<table>
<thead>
<tr>
<th>Timing of ART</th>
<th>% with VL&lt;50 c/ml</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preconception</td>
<td>75.4</td>
</tr>
<tr>
<td>1\textsuperscript{st} T</td>
<td>74.2</td>
</tr>
<tr>
<td>2\textsuperscript{nd} T</td>
<td>64.8</td>
</tr>
<tr>
<td>3\textsuperscript{rd} T</td>
<td>44.1</td>
</tr>
</tbody>
</table>

(P <0.001)

(Mandelbrot L, et al. 2015 *CID*)
## Perinatal transmission

### Timing of ART Initiation

<table>
<thead>
<tr>
<th>Maternal VL nearest delivery, copies/mL</th>
<th>Before Conception&lt;sup&gt;a&lt;/sup&gt;</th>
<th>1st Trimester (&lt;14 wk)</th>
<th>2nd Trimester (14–27 wk)</th>
<th>3rd Trimester (≥28 wk)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>PT, % (95% CI)</td>
<td>No. With PT/Total No.</td>
<td>PT, % (95% CI)</td>
<td>No. With PT/Total No.</td>
</tr>
<tr>
<td>≥400</td>
<td>2.2 (.7–5.0)</td>
<td>5/230</td>
<td>1.5 (.04–7.8)</td>
<td>1/69</td>
</tr>
<tr>
<td>50–400</td>
<td>0.3 (.01–1.8)</td>
<td>1/301</td>
<td>1.6 (.04–8.8)</td>
<td>1/61</td>
</tr>
<tr>
<td>Undetectable, threshold &gt;50</td>
<td>0.0 (0–1.7)</td>
<td>0/212</td>
<td>0.0 (0–6.8)</td>
<td>0/52</td>
</tr>
<tr>
<td>&lt;50</td>
<td>0.0 (0–1)</td>
<td>0/2651</td>
<td>0.2 (&lt;.01 to 1.1)</td>
<td>1/507</td>
</tr>
<tr>
<td>Missing VL</td>
<td>...</td>
<td>0/111</td>
<td>...</td>
<td>0/20</td>
</tr>
<tr>
<td>Undetermined child HIV status</td>
<td>...</td>
<td>... /287</td>
<td>...</td>
<td>... /55</td>
</tr>
</tbody>
</table>

Abbreviations: ART, antiretroviral therapy; CI, confidence interval; HIV, human immunodeficiency virus; PT, perinatal transmission; VL, viral load.

<sup>a</sup> In case of treatment interruption of the first ART regimen for >2 weeks in the first trimester, the date of treatment initiation was defined as the time when ART was reintroduced.

(Mandelbrot L, et al. 2015 *CID*)
Results

• Few cases of transmission with VL <50 c/mL at delivery occurred
  - when ART was started beyond the 1st T or interrupted during the pregnancy
  - ART initiated in the 1st T, nearly as effective as preconception ART

(Mandelbrot L, et al. 2015 CID)
Discussion

• Reports that neither C/S nor intrapartum IV AZT offer additional protection against perinatal transmission if LDL VL

• Postnatal prophylaxis (AZT or NVP) for the infant:
  - Trials needed to evaluate whether still required when mother has long-term optimal VL control with no breastfeeding

(Mandelbrot L, et al. 2015 CID)
The HIV-exposed uninfected infant
Issues of concern

• Risk of congenital abnormalities
• Pregnancy outcomes
• Cognitive and neurodevelopmental outcomes
• Altered immune activation
Issues of concern

- Impact of HIV infection vs. ART exposure
  - In utero environment in a HIV-infected woman
  - Long-term exposure to ART in utero and during breastfeeding

- Transient vs. lifelong effects
  - Clinical significance of findings
Purpose – to detect any major teratogenic effects of ARVs

Information voluntary and provided by healthcare providers

Prospective before pregnancy outcome is known

Updated after delivery
APR

Data source:

• Enrolls every year ~1300 pregnant women exposed to ARVs, in the US

• Additional 200 from other countries

• Other data from retrospective reports and clinical trials
APR

ADVISORY COMMITTEE CONSENSUS

• In reviewing all reported defects…the Registry finds no apparent increases in frequency of specific defects with 1st T exposures and no pattern to suggest a common cause
Adverse pregnancy outcomes
Adverse pregnancy outcomes

• Suggestion that cART is responsible for increased risk of adverse pregnancy outcomes

Conflicting results from different studies:

– Different populations studied
– Available obstetric care
– Adjustment for confounders; selection of exposure categories
– Inflammatory effect of HIV infection

(Li N, et al. JID 2015)
Adverse pregnancy outcomes

Potential mechanisms for ART and adverse pregnancy outcomes:

- **Immune reconstitution** – reverses pregnancy-associated cytokine changes

- Disruption of physiological angiogenesis in the **placenta**
  - lower placental weight, placental abnormalities, and placental insufficiency

(Li N, et al. *JID* 2015)
Timing of initiation of antiretroviral therapy and adverse pregnancy outcomes: a systematic review and meta-analysis


Lancet HIV 2017; 4: e21-30
Background

• Systematic review of studies from low-, middle- and high-income countries

• Studies done between January 1980 and June 2016

• 1° measure: to assess association between selected pregnancy outcomes and ART initiation pre-conception vs. after conception
Results

• 11 studies with 19 189 mother–infant pairs

• Women who started ART before conception significantly more likely to:

  - deliver preterm (RR 1.20, 95% CI 1.01–1.44)
  - very preterm (1.53, 1.22–1.92)
  - have LBW infants (1.30, 1.04–1.62)

• …than were those who began ART after conception
Results

• Associations highest in studies done in low- and middle-income countries

• ...where background rates of PTD and LBW are higher than in high-income countries

• Association with PI-use often reported

• ...background risk factors for these pregnancy outcomes not always controlled for
Results

- Few data exist for neonatal mortality
- No significant difference in risk of very LBW, SGA, severe SGA, and stillbirths
- ...data for the extent and severity of these risks are scarce and of low quality
Gestational diabetes

- PIs associated with insulin resistance and impaired glucose tolerance

- **BUT...** most studies in pregnant woman do not indicate an increased rate of GDM with their use

- HIV+ pregnant women on ART – standard pregnancy diabetes screening recommendations

- Some consider PI exposure a risk factor for glucose intolerance – earlier testing in pregnancy

(Li N, et al. *JID* 2015)
HIV-exposed infants: rethinking care for a lifelong condition

Sugandhi N, et al.

HEU children

- Data from Botswana – both weight for age and length for age significantly lower in HEU infants exposed to ART in utero

- Long-term impact unknown

- Could predispose the child to subsequent poorer health, obesity, chronic disease or cognitive dysfunction

HEU children

(Mofenson LM. 2015 CID)

- Limited data, 1° from high-resource settings, suggest that:

  - HIV and possibly ART exposure may be associated with immunologic and biologic abnormalities that could predispose HEU children to:

    - increased risk of illness and mortality, particularly in the first few years of life
HEU children

(Mofenson LM. 2015 CID)

• Firm conclusions about potential long-term effects of prolonged exposure to ART – in utero and during breastfeeding – in the HEU child, are lacking

• Role of socioeconomic factors
Implications for practice...
Implications for practice

• EFV-based ART recommended for 1\textsuperscript{st} line Rx

- Reassuring data on congenital abnormalities and ART exposure in early pregnancy
  - …but there’s still a need for continued surveillance
Implications for practice

- Jury still out on adverse pregnancy outcomes
  - Concerns about PTD, LBW and SGA
Implications for practice

• Limited data on long-term outcomes
  – morbidity and mortality
  – neurodevelopmental outcomes

• Limited, but data on ‘newer ARVs’
Case study

- 37yo P3G4, 8 weeks pregnant, HIV+ and not on ART
- Prior ART use in previous pregnancy
- Creatinine 95; CD4 600
- Antenatal, intrapartum, postpartum management