Acute infection with a wild-type HIV-1 virus in a PrEP user with high TDF levels

Elke Hoornenborg¹, Godelieve de Bree², on behalf of the Amsterdam PrEP Project in the HIV Transmission Elimination AMsterdam (H-TEAM) Initiative

¹ Department of Infectious Diseases, Public Health Service of Amsterdam, Amsterdam, the Netherlands; ² Academic Medical Center, Amsterdam Zuidoost, the Netherlands.

Background

Clinical trials show that pre-exposure prophylaxis (PrEP) with tenofovir/emtricitabine is highly effective against acquisition of HIV-infection. World-wide, only two cases of PrEP failure have been reported under adequate tenofovir-diphosphate (TFV-DP) levels in dried blood spots. Both these individuals were infected with a multi-class resistant virus.

Objective

We report an individual participating in the Amsterdam PrEP project who was infected with a wild-type HIV-1 with documented high levels of TFV-DP in dried blood spots.

Case report

- MSM, 50 years old, started daily PrEP
- HIV negative at PrEP start (HIV RNA (LIASON XL)) and after 1, 3 and 6 months (Ag/Ab)
- After PrEP start: twice rectal Neisseria gonorrhoea and once rectal Chlamydia trachomatis infection
- Reported the use of drugs during sex (amphetamine, cocaine, GHB/GBL, mephedrone and ketamine)
- Reported excellent adherence
- Adequate TDF-DP levels in dried blood spots, 2234 and 2258 fmol/punch, respectively, at six and eight months after start of PrEP
- Eight months after PrEP start: symptoms of fever and dysuria → HIV diagnostics: Ab positive; Ag and HIV RNA negative (see Figure 1 for details)

Table 1: Sexual risk behaviour of PrEP user who seroconverted for HIV with high TDF-DP levels in dried blood spots

<table>
<thead>
<tr>
<th>Month 1</th>
<th>Month 2</th>
<th>Month 3</th>
<th>Month 4</th>
<th>Month 5</th>
<th>Month 6</th>
<th>Month 7</th>
<th>Month 8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anal sex partners</td>
<td>75</td>
<td>65</td>
<td>65</td>
<td>50</td>
<td>38</td>
<td>49</td>
<td>66</td>
</tr>
<tr>
<td>Days he reported CAS²</td>
<td>100</td>
<td>100</td>
<td>Not reported</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CAS partners³</td>
<td>90</td>
<td>54</td>
<td>Not reported</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CAS episodes²</td>
<td>100</td>
<td>100</td>
<td>Not reported</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a Per month, data collected via daily diary via application for mobile phone
b In 12 weeks period, collected through computer-assisted self-reported questionnaires

Time point dried blood spots were collected

Discussion and conclusion

- First case of infection with wild type HIV-1 in a person with documented supposedly protective intracellular levels of TFV-DP.
- Underlying mechanism remains speculative:
  - High repeated HIV exposure and/or mucosal damage?
  - Lower levels of TDF and/or FTC in rectal mucosa?
- Atypical pattern of seroconversion, potentially due to an aberrant immune response under PrEP.
- This underscores the importance of regular HIV testing in PrEP users and being aware of potential atypical patterns of seroconversion.

Figure 1: A: Use of PrEP and timing of HIV tests (X-axis), and plasma HIV RNA (copies/mL) (Y-axis) B: Western blot performed at seroconversion (indicated by asterisk).

The H-TEAM initiative is being supported by: Aids Fonds (grant number: 2013169), Amsterdam Dinner Foundation, Bristol-Myers Squibb International Corp. (study number: AI424-541), Gilead Sciences Europe Ltd (grant number: PA-HIV-PREP.16-0024), Gilead Sciences (protocol numbers: CO-NL-276-4222, CO-US-276-1712), Janssen Pharmaceutica (reference number: PHNL/JAN/0714/0005b/1912fde), M.A.C AIDS Fund, ViiV Healthcare (PO numbers: 3000268822, 3000747780) and ZonMw (grant number: 52002003).