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

**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

- **No HIV-DNA was detected in bulk peripheral blood mononuclear cells and no HIV-DNA and RNA (cDNA) from three sigmoid biopsies at the moment of seroconversion** → no acute HIV infection diagnosed

- PrEP was interrupted, HIV RNA tested at regular intervals (Fig 1), and became detectable after 3 weeks

- No HIV-1 mutations in reverse transcriptase or protease associated with resistance against TDF, FTC, or other antiretroviral agents (routine sequencing)

- Started tenofovir/emtricitabine 1 tab OD, boosted darunavir 800mg/100mg OD and dolutegravir 50mg TD, resulting in an undetectable load after one month

## 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</th>
<th>Anal sex partners</th>
<th>Days he reported CAS¹</th>
<th>Median (IQR) number of sex partners per day with CAS²</th>
<th>CAS partners</th>
<th>CAS episodes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>75</td>
<td>103/28</td>
<td>[1-3.5] [1-2.5-8.5]</td>
<td>90</td>
<td>90</td>
</tr>
<tr>
<td>2</td>
<td>57</td>
<td>103/33</td>
<td>[1-3.5] [1-2.5-8.5]</td>
<td>90</td>
<td>90</td>
</tr>
<tr>
<td>3</td>
<td>38</td>
<td>103/28</td>
<td>[1-3.5] [1-2.5-8.5]</td>
<td>Not reported</td>
<td>Not reported</td>
</tr>
<tr>
<td>4</td>
<td>49</td>
<td>103/28</td>
<td>[1-3.5] [1-2.5-8.5]</td>
<td>Not reported</td>
<td>Not reported</td>
</tr>
<tr>
<td>5</td>
<td>66</td>
<td>103/28</td>
<td>[1-3.5] [1-2.5-8.5]</td>
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<td>Not reported</td>
</tr>
<tr>
<td>6</td>
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<td>[1-3.5] [1-2.5-8.5]</td>
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</tr>
<tr>
<td>7</td>
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<td>103/28</td>
<td>[1-3.5] [1-2.5-8.5]</td>
<td>Not reported</td>
<td>Not reported</td>
</tr>
</tbody>
</table>

¹ Per month, data collected via daily diary via application for mobile phone
² In 12-week periods, collected through computer-assisted self-reported questionnaires

## 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.

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The H-TEAM initiative is being supported by: Aids Fonds (grant number: 201316/9), Amsterdam Dinner Foundation, Bristol-Myers Squibb International Corp. (study number: AI424-541), Gilead Sciences Europe Ltd (grant number: PA-HIV-MAP-16-0024), Gilead Sciences (protocol numbers: CO-NL-276-4222, CO-US-276-1712), Janssen Pharmaceutica (reference number: PTH/LIJAN-0714/0005b/1912Id), M.A.C AIDS Fund, ViiV Healthcare (PO numbers: 3000266822, 3000747780) and ZonMw (grant number: 220020003).