Early experience of dolutegravir pharmacokinetics in pregnancy: high maternal levels and significant foetal exposure with twice-daily dosing

Dolutegravir is licenced for use in both adults and children over 12 years of age, although data are limited on its use in pregnant women. The manufacturer suggests that dolutegravir should be used in pregnancy only if the benefits outweigh the risks [1]. UK and US guidelines state that there are insufficient data to make recommendations on its use in pregnancy [2,3]. Nevertheless there are sporadic case reports of successful use in pregnant women [4,5] with significant placental transfer suggested by ex-vivo models [6] and a case report in vivo [5]. However, the effect of pregnancy on dolutegravir pharmacokinetics and optimal dosing during pregnancy is unknown. Here, we present our early experience of dolutegravir pharmacokinetics in two pregnant women, including the first published report of truncated 8-h pharmacokinetic profiles of dolutegravir in the first and third trimesters, in addition to measurement of foetal dolutegravir levels in umbilical cord blood.

Our unit has treated two pregnant women with dolutegravir, in both cases with extensive drug resistance where dolutegravir was justified to prevent onward transmission. The first was a 23-year-old woman who was referred in April 2015 for HIV management when she was 9 weeks pregnant, with a CD4 cell count of 158 cells/μl and an HIV viral load of 563 343 copies/ml. She was previously known to our services and had been well controlled on elvitegravir, cobicistat, and emtricitabine, coformulated with ritonavir, before starting dolutegravir. She was switched from tenofovir to dolutegravir and lamivudine at 9 weeks gestation due to declining renal function.

We present two cases of pregnant women treated with dolutegravir. The first was a 23-year-old woman who was treated with dolutegravir and lamivudine, in both cases with extensive drug resistance.

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DOI:10.1097/QAD.0000000000001054
Eight hour truncated pharmacokinetic profiling of dolutegravir was carried out at week 13 gestation (Fig. 1). This showed a peak dolutegravir concentration ($C_{\text{max}}$) of 4006 ng/ml in excess of the mean $C_{\text{max}}$ of 3400 ng/ml in the SPRING-1 study for nonpregnant adults taking 50 mg q.d. of dolutegravir, and well above the protein-binding corrected IC$_{90}$ of 64 ng/ml for wild-type virus [7]. Area under the curve over 0–8 h (AUC$_{0-8}$) was 15.9 µg.h/ml.

Despite this, she experienced two rebounds in viral load to 625 and 325 copies/ml, in the context of significant medical problems (a pulmonary embolus and hydronephrosis complicated by bacteraemia). We addressed adherence concerns and her treatment was changed, at 22 weeks of gestation, to b.i.d. darunavir/ritonavir (600/100 mg) and twice daily dolutegravir (50 mg) in the anticipation that exposure to DTG would be reduced in the third trimester. Her viral load resuppressed and repeat pharmacokinetic profiling at 32 weeks of gestation (Fig. 1) showed a $C_{\text{max}}$ of 3334 ng/ml, with AUC$_{0-8}$ 13.5 µg.h/ml, a reduction of 15%.

She delivered a healthy baby by planned caesarean section at 39 weeks of gestation; dolutegravir concentrations at delivery (13 h postdose) were 1730 ng/ml in maternal blood and 2211 ng/ml in cord blood, suggesting significant in-utero exposures. On review at 8 weeks, mother and baby were well; the baby’s T and B cell numbers were normal, and are thus far uninfected.

The second woman, aged 27, had poor engagement with services; she was presented in September 2015 at 31 weeks of gestation, with a CD4 cell count of 124 cells/µl and HIV-1 viral load of 235 copies/ml. She was last seen a year previously following delivery of her second child. At that time, she was virologically suppressed on zidovudine, lamivudine, raltegravir, and lopinavir/ritonavir, but had subsequently defaulted from clinic attendance. In view of her late presentation and uncertain resistance profile, she was started on b.i.d. dolutegravir (50 mg) and darunavir/ritonavir (600 mg/100 mg), and once q.d. coformulated tenofovir/emtricitabine (300 mg/200 mg). This was well tolerated and 4 weeks later her HIV-1 viral load was undetectable. She delivered a healthy baby in November 2015 at 38 weeks of gestation by planned caesarean section. Dolutegravir concentration in umbilical cord blood was 1281 ng/ml, again suggesting significant in-utero exposures. On review at 6 weeks, the baby was well, and is thus far uninfected. We have reported both cases to the antiretroviral pregnancy registry (http://www.apregistry.com/Default.aspx) and follow-up of both mothers and babies is on-going.

In conclusion, we present the first detailed pharmacokinetic profile of dolutegravir in pregnancy, and confirm significant foetal exposure at a dose of 50 mg b.i.d.. The effects of this level of in-utero exposure are unknown, but we suggest caution with b.i.d. dolutegravir dosing; if this dose is used, we suggest careful follow-up to assess for toxicity in the child. Further studies of dolutegravir in pregnancy are necessary to define the dosing schedule and assess safety.

Acknowledgements

Conflicts of interest

There are no conflicts of interest. This work received no specific funding. J.L. is supported by the Wellcome Trust as a Wellcome Trust clinical PhD fellow (grant number 109105/Z/15/Z).

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Received: 14 January 2016; accepted: 1 February 2016.
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DOI:10.1097/QAD.0000000000001055