Impact of TDF Discontinuation and Bisphosphonates on Bone Density T Scores in People with HIV

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BACKGROUND

People with HIV (PWH) have a higher prevalence of osteoporosis compared to people without HIV. Bone loss is multifactorial and accelerated by chronic inflammation, ART, particularly TDF, and ageing. Bisphosphonates (BP) are recommended for osteoporosis treatment, but evidence on the extent to which TDF discontinuation is sufficient to improve bone health in PWH with or without BP initiation is limited.

METHODS

In the cohort who had dual energy X-ray absorptiometry (DXA) at Chelsea and Westminster Hospital, London, we identified PWH diagnosed with osteoporosis (T-score ≤-2.5) who had at least one follow-up DXA between 2009-2024. The impact of TDF exposure (never, continued, stopped at DXA, past) and BP initiation on the annualized rate of change in femoral and spinal T-scores (delta standard deviation [SD] units/year) was assessed by mixed-effects models adjusted for demographics, HIV, lifestyle covariates, with interaction terms for drug effects. P values were adjusted for False Discovery Rate (FDR).

RESULTS

- Among 907 PWH who had DXA scans, 115 (12.7%) had osteoporosis.
- **Site Prevalence of Osteoporosis:**
  - Spine only: 91 (79.1%)
  - Femur only: 8 (6.9%)
  - Both sites: 15 (13.0%)
- **Characteristics:**
  - 82.6% male; 96.5% virally suppressed
  - Mean age: 56 years; median CD4+: 659 cells/µL
  - 60.9% on TDF (22.8% with PI/b)
- **Follow-up (mean 3.6 years):**
  - 45 (39.1%) discontinued TDF
  - 44 (38.2%) initiated bisphosphonates (BP)
- **Spinal BMD (Table 1, Figure 1):**
  - Improved primarily in individuals initiating BP, and in those with stopped or continued TDF exposure
  - No improvement without BP among those never or previously exposed to TDF
- **Femoral BMD (Table 1, Figure 2):**
  - Improved predominantly as a function of TDF exposure history

Bisphosphonates drive improvement in spinal bone density, while femur bone density improves with changes in TDF exposure

Table 1. The Impact of TDF exposure and BP on the annualized rate of change in femoral and spinal T-scores

TDF	BP	Spine: Annual slope (Δ spine T-score SD / year; 95%CI)	p	FDR-q	Femur: Annual slope (Δ femur T-score SD / year; 95% CI)	p	FDR-q
Never	No	+0.06 (-0.043; 0.16)	0.255	0.291	**+0.049 (0.012 to 0.085)**	**0.009**	**0.024**
	Yes	**+0.21(0.13; 0.29)**	**<0.001**	**0.0002**	+0.049 (−0.004 to 0.10)	0.071	0.095
Past	No	+0.03 (-0.041; 0.093)	0.446	0.446	+0.046 (−0.020 to 0.11)	0.169	0.193
	Yes	**+0.13 (0.025; 0.24)**	**0.015**	**0.020**	+0.042 (−0.11 to 0.19)	0.590	0.590
Continued	No	**+0.14 (0.085; 0.20)**	**<0.001**	**0.0002**	**+0.17 (0.10 to 0.24)**	**<0.001**	**0.004**
	Yes	**+0.19 (0.082; 0.31)**	**0.001**	**0.0016**	+0.13 (−0.013 to 0.27)	0.076	0.095
Stopped	No	**+0.22 (0.10; 0.34)**	**<0.001**	**0.0002**	**+0.13 (0.063 to 0.19)**	**<0.001**	**0.004**
	Yes	**+0.19 (0.10; 0.27)**	**<0.001**	**0.0002**	**+0.072 (0.015 to 0.13)**	**0.013**	**0.026**

Figure 1: Change in spine T-score over time by TDF and BP status

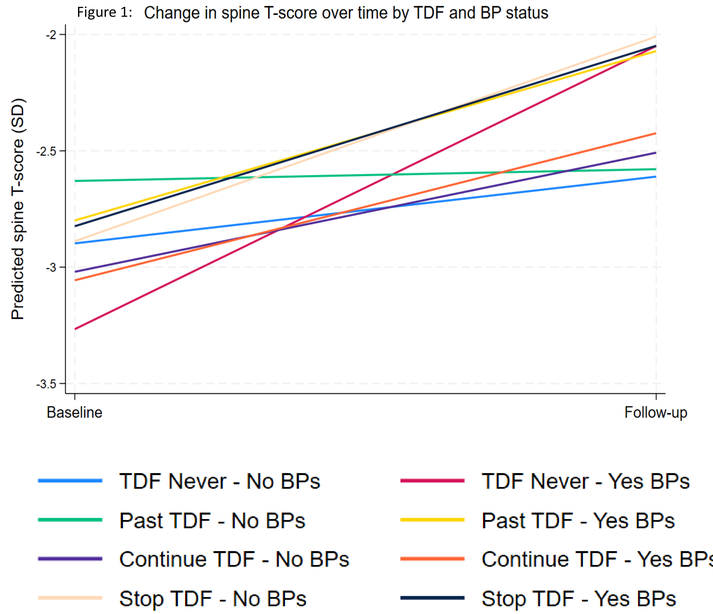
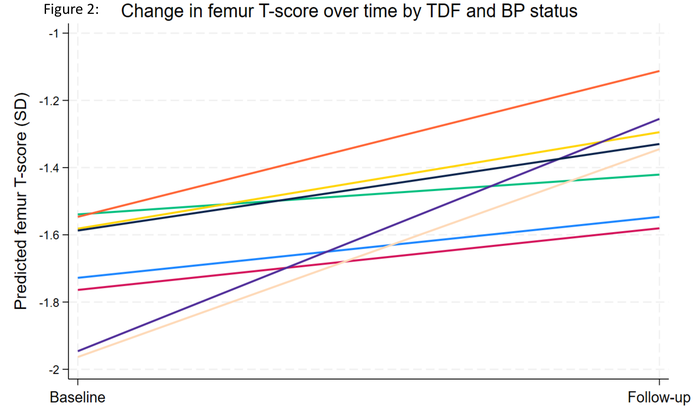


Figure 2: Change in femur T-score over time by TDF and BP status



CONCLUSIONS

- Spine bone density improved over time primarily in individuals initiating BP therapy and in those who continued or stopped TDF exposure, whereas no significant improvement was observed in TDF-naïve or past-exposed individuals without BP treatment.
- Femur bone density improved predominantly as a function of TDF exposure history, with comparatively modest additional effects of BP treatment.
- Site-specific differences in treatment response likely reflect the predominance of spinal osteoporosis at baseline, with limited femoral involvement and consequently reduced dynamic range for hip density improvements.

ADDITIONAL KEY INFORMATION

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