

Philip Lackey,¹ Laurence Brunet,² Jennifer Fusco,² Gerald Pierone Jr,³ Michael Wohlfeiler,⁴ Douglas Dieterich,⁵ Cassidy Henegar,⁶ Vani Vannappagari,⁶ Bryn Jones,⁷ Annemiek de Ruiter,⁷ Gregory Fusco²

¹ Wake Forest University School of Medicine, Winston-Salem, NC, USA; ² EpiVidian, Inc., Raleigh, NC, USA; ³ Whole Family Health Center, Vero Beach, FL, USA; ⁴ AIDS Healthcare Foundation, Miami, FL, USA; ⁵ Icahn School of Medicine at Mount Sinai, New York, NY, USA; ⁶ ViiV Healthcare, Durham, NC, USA; ⁷ ViiV Healthcare, London, UK



Background

- ◆ People with HIV have a higher likelihood of developing HTN compared to people without HIV (risk ratio: 1.12; 95% CI: 1.02, 1.23)¹
- ◆ The literature on the association between modern ART and HTN is conflicting:
 - The RESPOND consortium of HIV cohorts reported a higher incidence of HTN with regimens containing an INSTI, TAF, or both compared to regimens containing neither²
 - In a pooled analysis of the SPRING-1, SPRING-2, SINGLE, and FLAMINGO clinical trials, the odds of incident HTN did not differ between DTG and other regimens among ART-naïve individuals without HTN³

Objective

To assess incident hypertension with or without INSTI or TAF use in routine clinical care in the US

Methods

OPERA® Cohort

- ◆ Database of prospectively collected electronic health records
- ◆ 147,423 people with HIV receiving routine care at 103 clinics across the US and Puerto Rico

Study Population

- ◆ ≥18 years old people with HIV
- ◆ Started a new ART regimen (DTG/3TC, INSTI + 2 NRTIs, bPI + 2 NRTIs, or NNRTI + 2 NRTIs) between 01JAN2016 and 31DEC2022
- ◆ Baseline BP (at regimen initiation):
 - **Normal BP** (SBP < 120 mmHg, DBP < 80 mmHg) or
 - **Normal/elevated BP** (SBP < 140 mmHg, DBP < 90 mmHg)
- ◆ No HTN Dx or current antihypertensive Rx
- ◆ ≥ 2 blood pressure measurements during follow-up

Incident HTN Definition

- ◆ Any of the following:
 - 2 consecutive SBP ≥ 140 mmHg and/or DBP ≥ 90 mmHg
 - New HTN diagnosis
 - New antihypertensive prescription

Statistical Analyses

- ◆ IR of HTN per 100 person-years: univariate Poisson regression
- ◆ Adjusted incidence rate ratios: multivariate Poisson regression
 - Comparison groups: INSTI without TAF (reference), INSTI with TAF, bPI with/without TAF, NNRTI with/without TAF
 - Adjusted for baseline age (quadratic), female sex, black race, VL (quadratic), diabetes, eGFR (quadratic), SBP (quadratic), time-updated BMI (quadratic).

Abbreviations

ART, antiretroviral therapy; BMI, body mass index; BP, blood pressure; bPI, boosted protease inhibitor; DBP, diastolic BP; DTG, dolutegravir; Dx, diagnosis; eGFR, estimated glomerular filtration rate; HTN, hypertension; INSTI, integrase strand-transfer inhibitor; IR, incidence rate; IRR, incidence rate ratio; NNRTI, non-nucleoside reverse transcriptase inhibitor; NRTI, nucleoside reverse transcriptase inhibitor; py, person-years; Rx, prescription; SBP, systolic blood pressure; TAF, tenofovir alafenamide; VL, viral load

Results

Figure 1. Study population by baseline blood pressure level

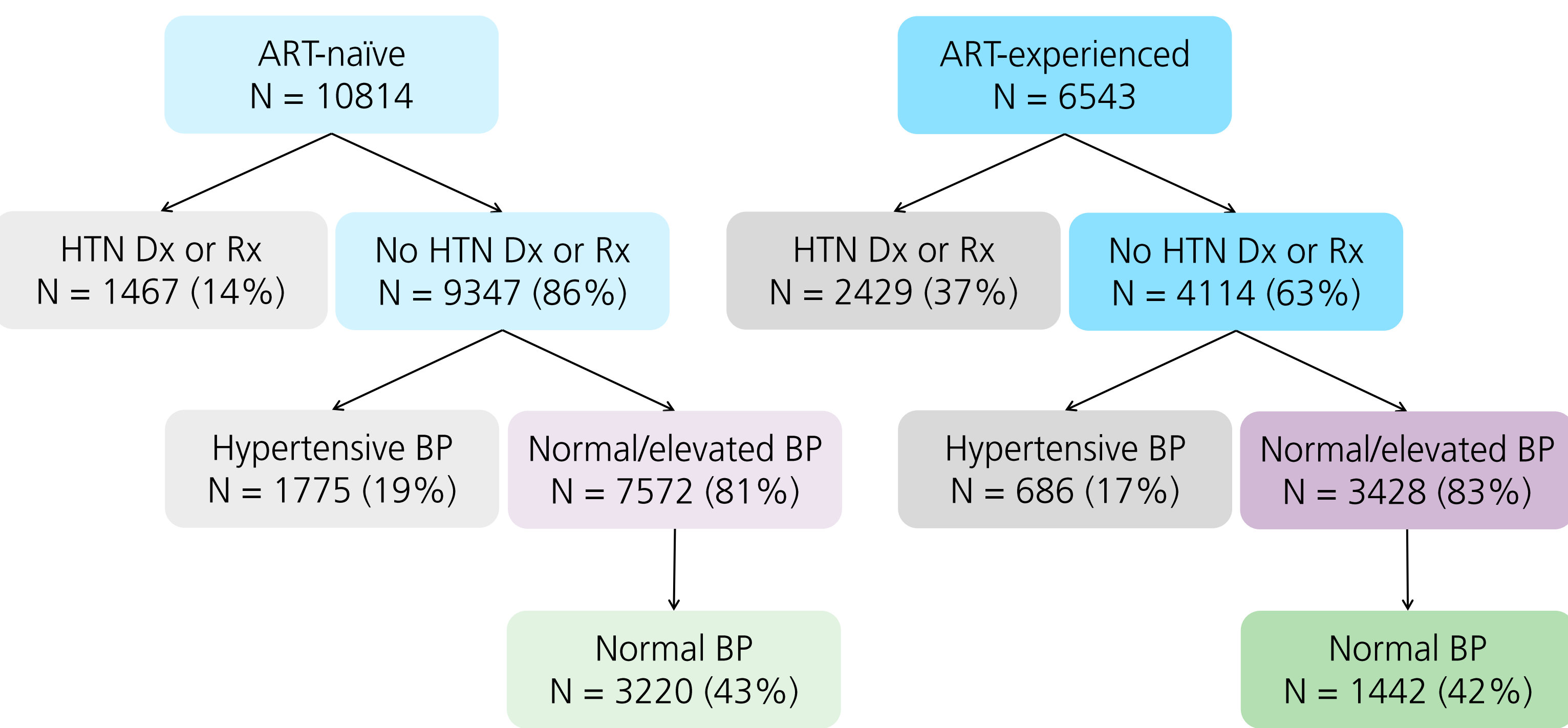


Table 1. Baseline population characteristics

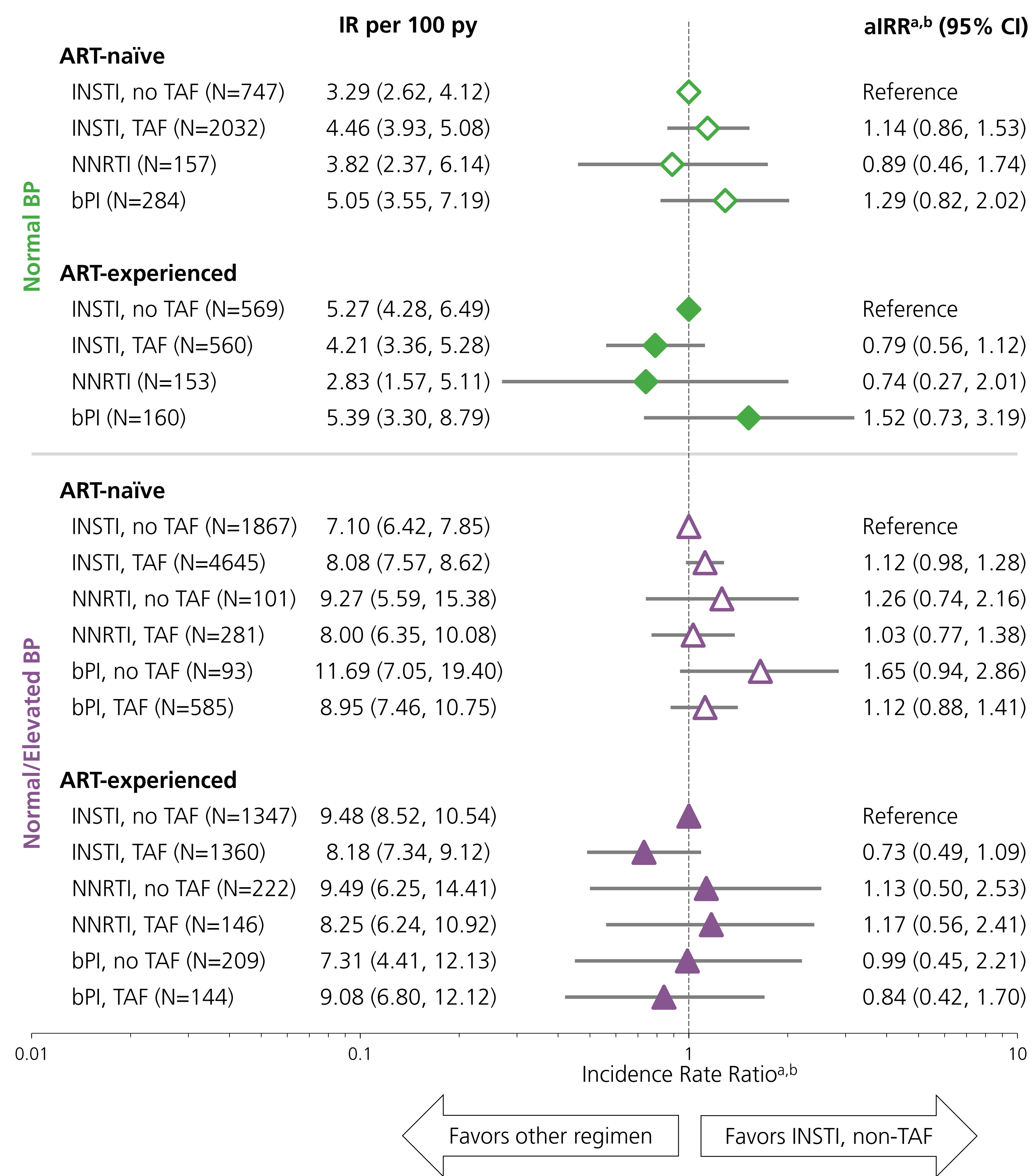
	Normal BP		Normal/elevated BP	
	ART-naïve N = 3220	ART-experienced N = 1442	ART-naïve N = 7572	ART-experienced N = 3428
Median age (IQR)	30 (25, 38)	41 (32, 51)	30 (25, 38)	42 (32, 51)
Female sex, n (%)	519 (16)	311 (22)	953 (13)	605 (18)
Black race, n (%)	1710 (53)	576 (40)	4031 (53)	1343 (39)
Median HIV viral load (IQR)	64835 (16088, 234500)	20 (<20, 528)	57345 (15400, 193000)	<20 (<20, 320)
Diabetes, n (%)	35 (1)	63 (4)	100 (1)	160 (5)
Median eGFR (IQR)	117 (104, 130)	102 (87, 116)	116 (102, 129)	101 (85, 115)
Median BMI (IQR)	23 (21, 26)	24 (22, 28)	24 (21, 28)	25 (22, 29)

Table 2. Incident HTN over follow-up

	Normal BP		Normal/elevated BP	
	ART-naïve N = 3220	ART-experienced N = 1442	ART-naïve N = 7572	ART-experienced N = 3428
Median months of follow-up (IQR)	30 (18, 50)	33 (18, 57)	30 (19, 50)	34 (19, 57)
Median # of BP per person (IQR)	6 (3, 10)	7 (3, 12)	6 (3, 10)	7 (4, 11)
Incident HTN, n (%) ^a	355 (11)	191 (13)	1497 (20)	796 (23)
2 consecutive BP, n (%)	179 (50)	92 (48)	996 (67)	507 (64)
HTN Dx, n (%)	138 (39)	57 (30)	666 (44)	317 (40)
Antihypertensive Rx, n (%)	248 (70)	137 (72)	850 (57)	475 (60)
IR per 100 person-years (95% CI)	4.16 (3.75, 4.61)	4.60 (3.99, 5.30)	7.89 (7.50, 8.30)	8.76 (8.17, 9.39)

^a Categories of HTN are not mutually exclusive

Figure 2. Association between ART regimen and incident HTN



^a Multivariate Poisson regression adjusted for baseline age, female sex, black race, VL, diabetes, eGFR and SBP, as well as time-updated BMI

^b Individuals missing BMI, race, or eGFR data were excluded from the multivariate Poisson modelling (Normal BP – ART-naïve: n=288; Normal BP – ART-experienced: n=198; Normal/Elevated BP – ART-naïve: n=703; Normal/Elevated BP – ART-experienced: n=472)

Discussion

- ◆ In this large US cohort of routine clinical care, a substantial proportion had prevalent HTN Dx, antihypertensive Rx, or BP indicative of HTN (30% of all ART-naïve and 48% of all ART-experienced individuals), and were thus excluded from further analyses (Figure 1)
- ◆ The overall rate of incident HTN was twice as high among individuals with normal/elevated baseline BP compared to those with normal baseline BP (Table 2)
- ◆ No statistically significant difference was detected in rates of incident HTN across regimens (Figure 2)
 - Among ART-naïve individuals with normal/elevated BP, a modest, non-statistically significant elevated risk was observed for INSTI with TAF and bPI without TAF, compared to INSTI without TAF
- ◆ Strengths: very large study population derived from the real-world OPERA cohort with rich routine clinical data; adjustment for potential confounders, including time-updated BMI
- ◆ Limitations: ART regimen categories collapsed due to small number of events among those with normal BP on an NNRTI or bPI with/without TAF; exclusion of individuals with missing covariates (9-14%)

Key Findings

- High prevalence and incidence rates of hypertension among people with HIV in the OPERA cohort
- No statistically significant association was detected between ART regimens and incident hypertension

Acknowledgements

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Support ViiV Healthcare



References

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3. Patel, et al. [abstract LBEP12] IAS 2023.

