

Changes in BMI associated with antiretroviral regimens in treatment-experienced, virologically suppressed individuals living with HIV

Karam Mounzer, M.D.

Philadelphia FIGHT, Philadelphia, PA, USA

Karam Mounzer, Laurence Brunet, Ricky Hsu, Terra Fatukasi, Jennifer Fusco, Vani Vannappagari, Cassidy Henegar, Jean van Wyk, Melissa Crawford, Janet Lo, Gregory Fusco

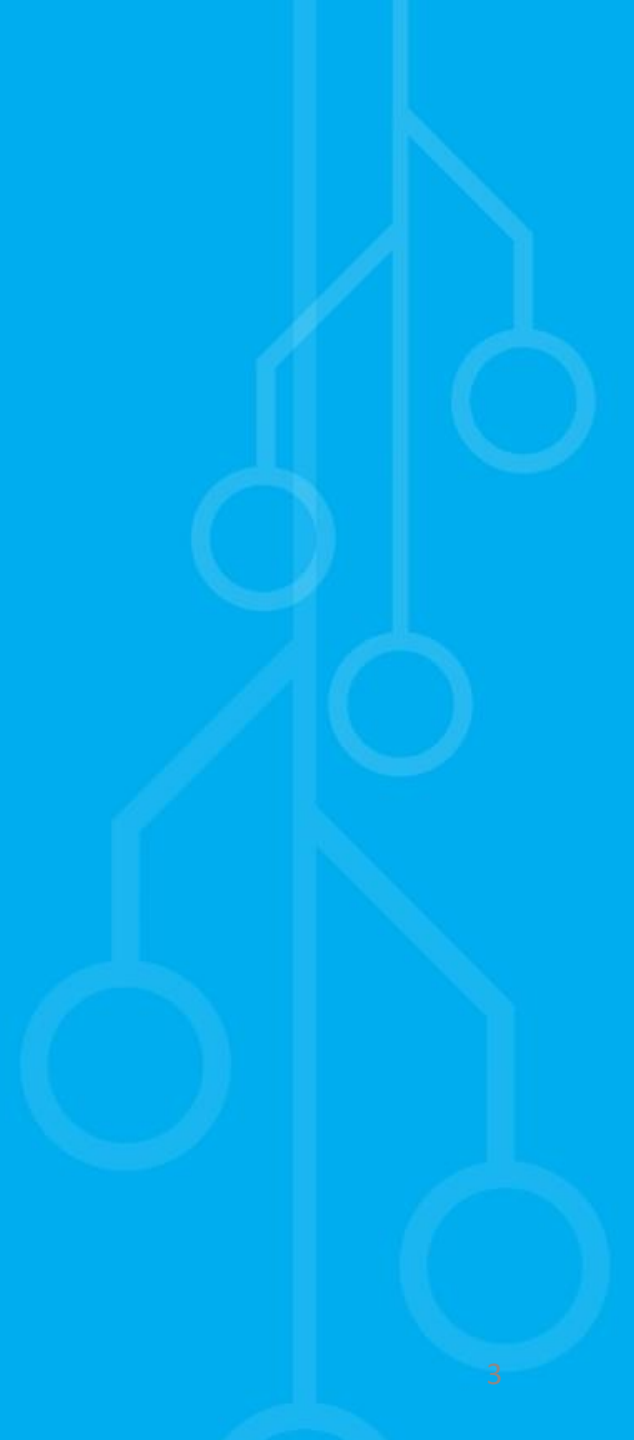
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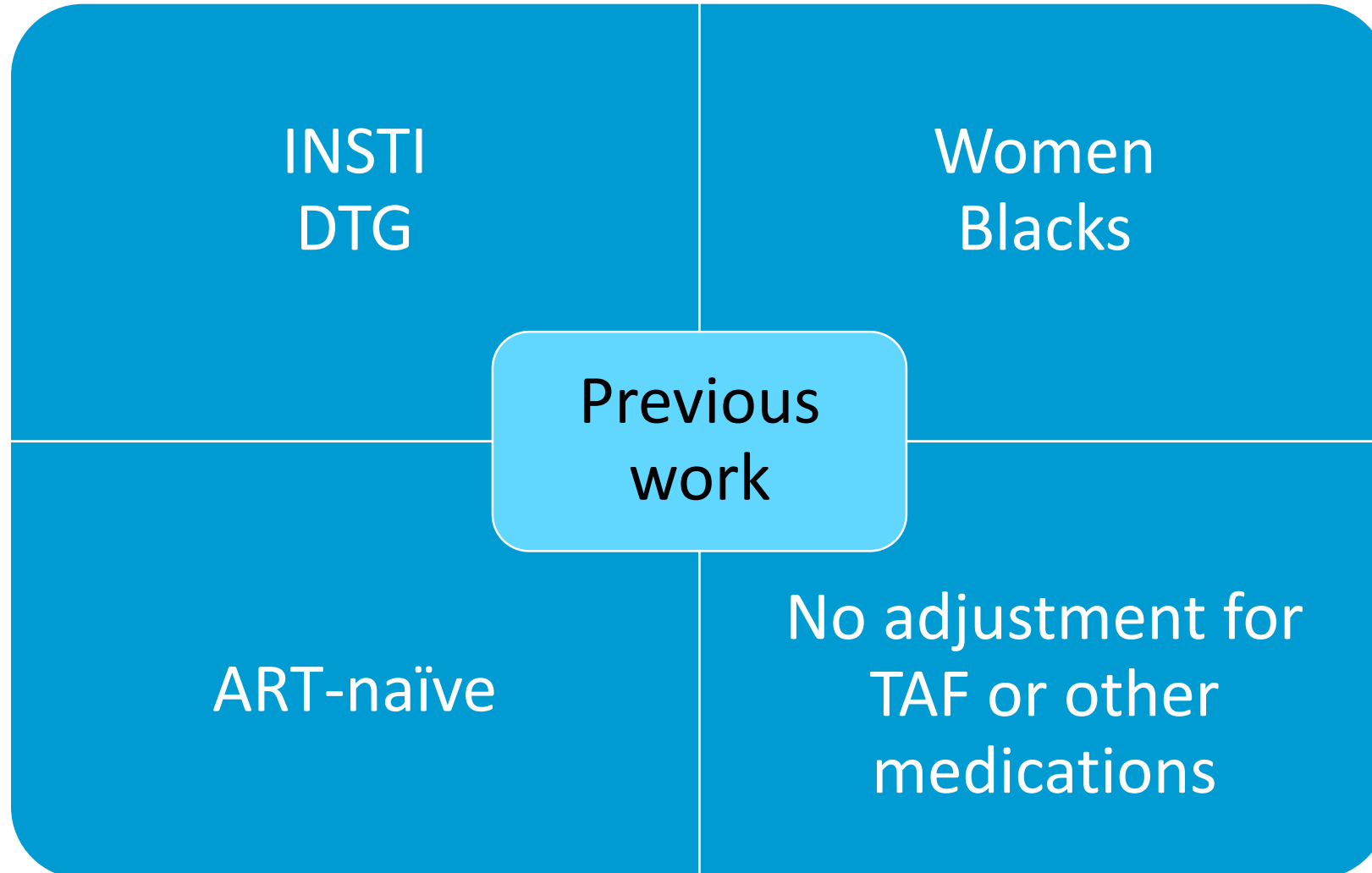
Disclosure

- Industry funded research/investigator: ViiV, Merck, Janssen, Gilead Sciences
- Consultant: ViiV, Merck, Janssen, Gilead Sciences
- Speakers Bureau: ViiV, Merck, Janssen, Gilead Sciences
- Advisory Committee/Board: Epividian

Background



Background



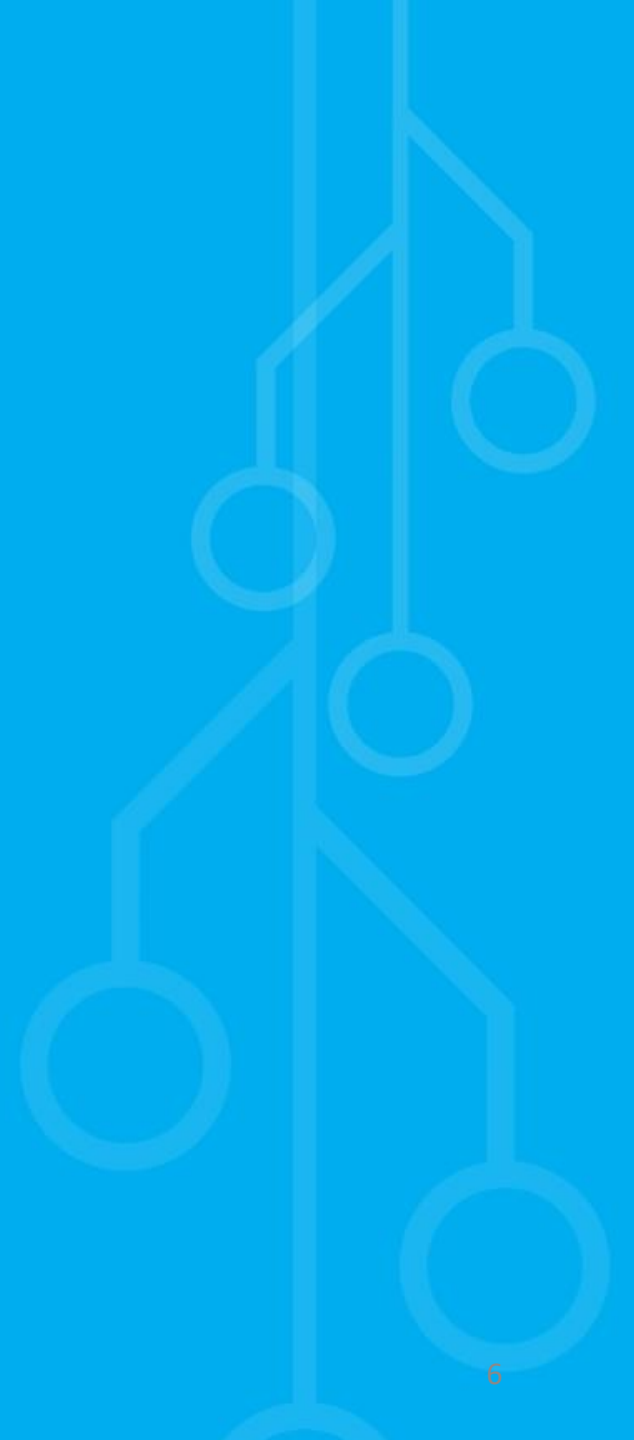
Objective

To compare changes in **BMI**

among **ART-experienced, virologically-suppressed PLWH**

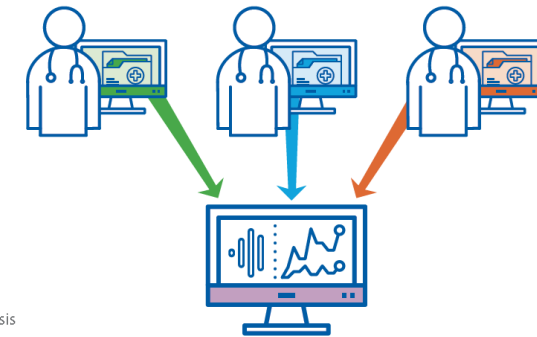
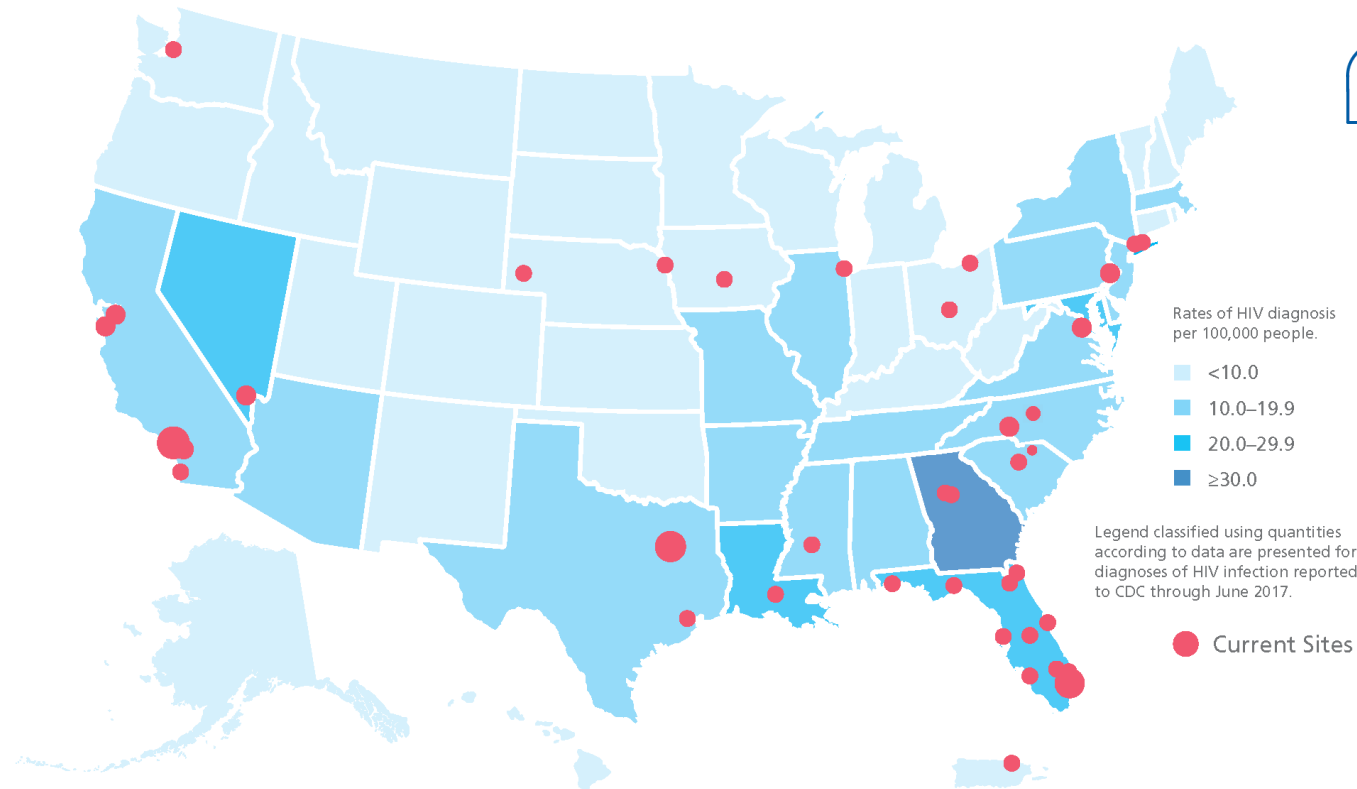
after a switch to DTG, EVG/c, RAL, RPV, or bDRV

Methods



OPERA Cohort

- Prospectively captured, routine clinical data from electronic health records
- 100,000+ PLWH, 65 cities, 19 States, 1 US Territory



~ 8%
of all PLWH receiving
care in the US

Study Population

- ART-experienced, suppressed (Baseline viral load <200 copies/mL)
- ≥18 years of age, no pregnancy, not transgender
- Switching to a new 3-drug regimen between 01AUG2013 and 31DEC2017
- First exposure to DTG, EVG/c, RAL, RPV or bDRV
- ≥ 1 plausible BMI ≤ 3 months before or at initiation (plausible BMI ≥10 and ≤50)
- ≥ 1 plausible BMI after switch at 6, 12, or 24 months (±3 months)

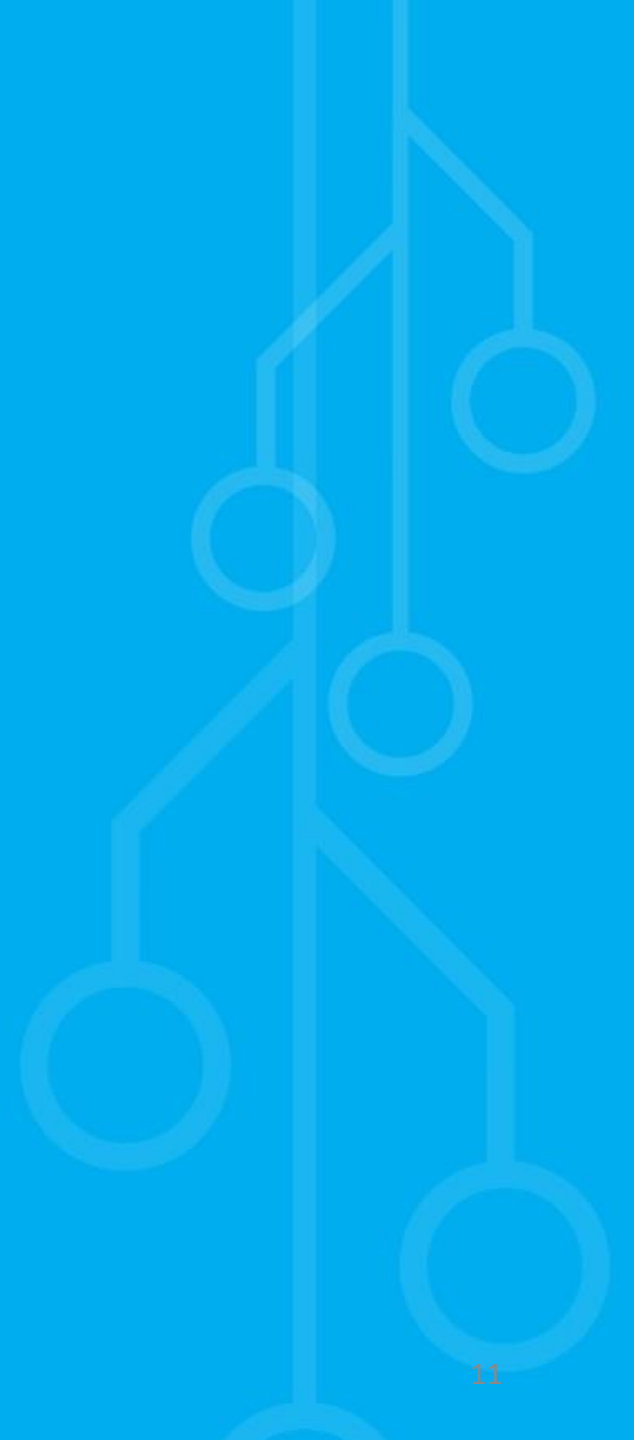
Statistical analyses

- Mean BMI changes measured at either 6, 12, or 24 months \pm 3 months, by core agent
- Multivariable linear regression adjusted for baseline covariates:
 - BMI
 - Age
 - Sex
 - Race/ethnicity
 - Substance abuse
 - Viral load
 - CD4 count
 - Lipodystrophy
 - Endocrine disorders
 - Hypertension
 - Medications associated with weight gain (\geq 30 days)
 - Medications associated with weight loss (\geq 30 days)
 - TAF use

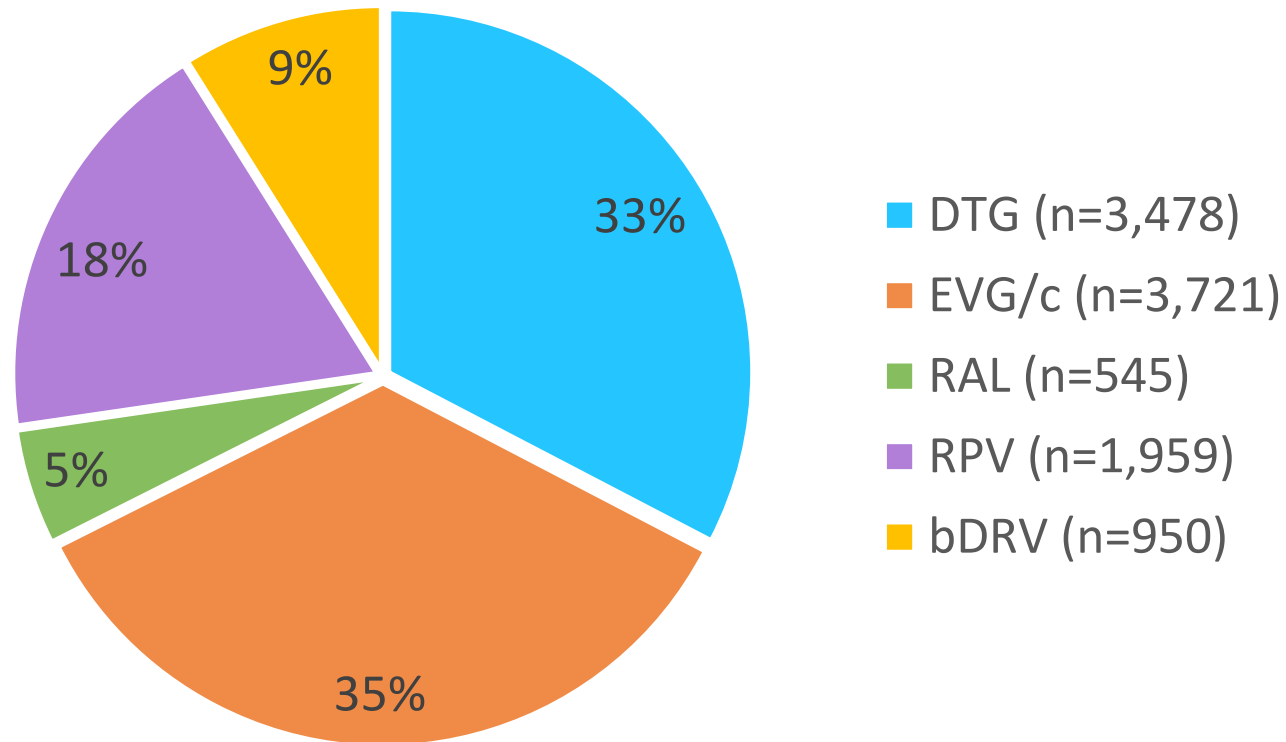
Sensitivity analyses

- Stabilized inverse probability-of-censoring weights (IPCW) to account for censoring
 - Regimen change, Loss to follow-up, Death, Pregnancy, No BMI measured within time window of interest, Study end (31DEC2018)
- Stratification: baseline BMI categories

Results



Overall study population (N=10,653)



Baseline characteristics



	DTG	EVG/c	RAL	RPV	bDRV
Age ≥50	1446 (42%)	1084 (29%)*	292 (54%)*	615 (31%)*	379 (40%)
Female	491 (14%)	493 (13%)	87 (16%)	373 (19%)*	202 (21%)*
Non-Hispanic Black	1118 (32%)	1240 (33%)	165 (30%)	764 (39%)*	398 (42%)*
Substance abuse	520 (15%)	419 (11%)*	67 (12%)	209 (11%)*	118 (12%)*
Hypertension	1084 (31%)	938 (25%)*	211 (39%)*	489 (25%)*	247 (26%)*
Endocrine disorders†	1462 (42%)	1305 (35%)*	245 (45%)	655 (33%)*	299 (31%)*
Medications associated with weight gain	800 (23%)	621 (17%)*	159 (29%)*	354 (18%)*	203 (21%)
TAF use	362 (10%)	2086 (56%)*	26 (5%)*	770 (39%)*	133 (14%)*

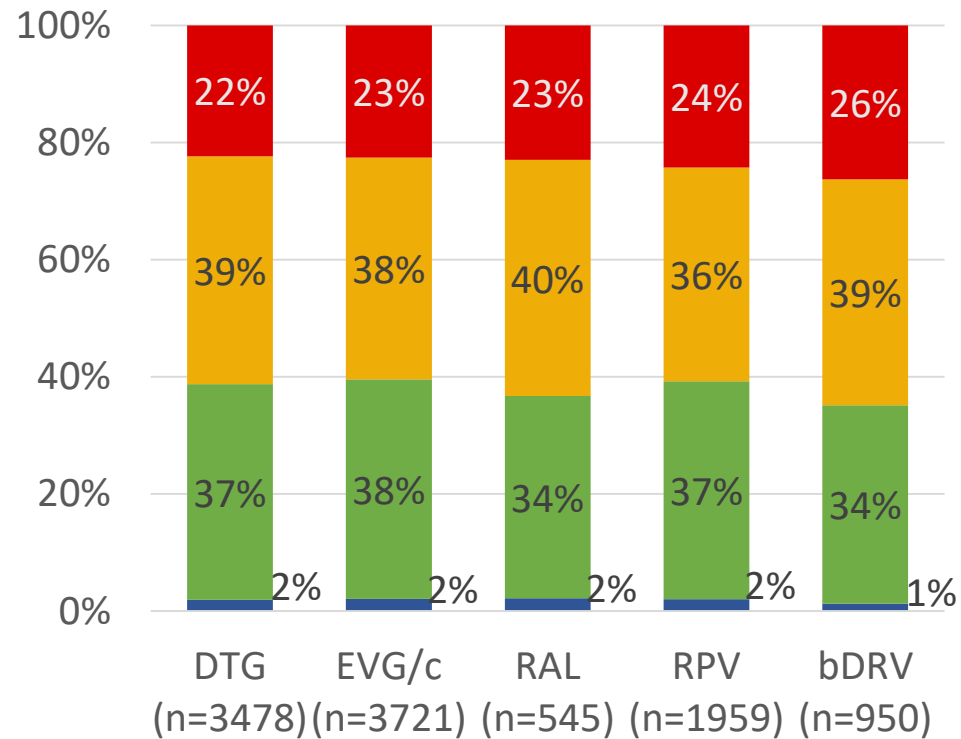
* p-value <0.05 for the comparison with DTG

† Type 1 Diabetes Mellitus, Type 2 Diabetes Mellitus, Hyperlipidemia, Hyperthyroidism, Hypothyroidism, or Thyroiditis

Baseline BMI

■ Underweight (BMI <18.5) ■ Normal (BMI ≥18.5 to <25) ■ Overweight (BMI ≥25 to <30) ■ Obese (BMI ≥30)

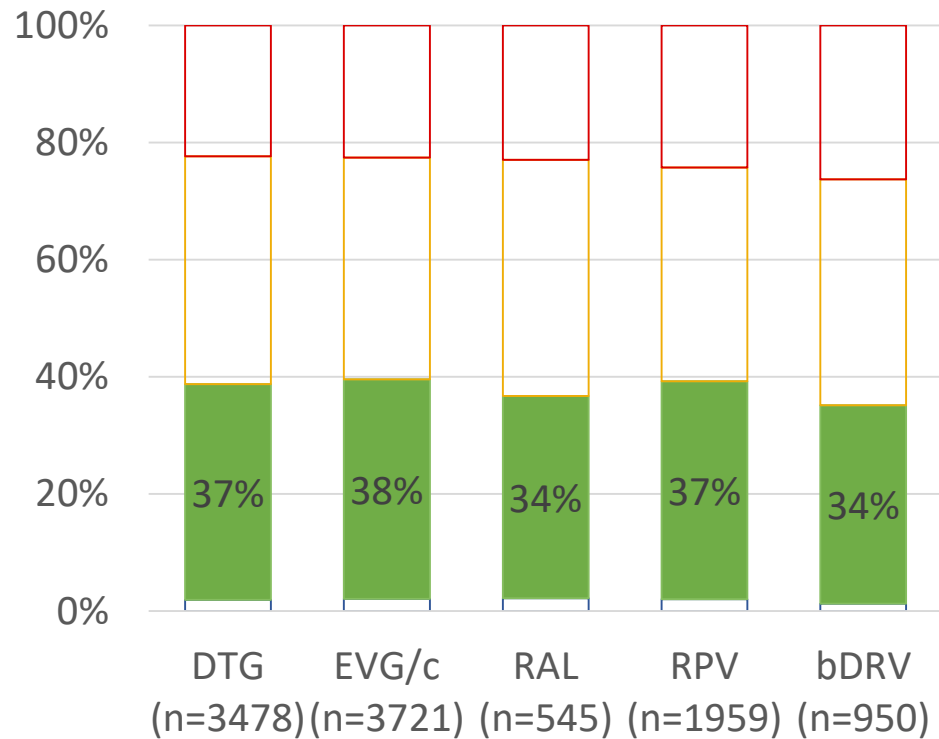
Baseline



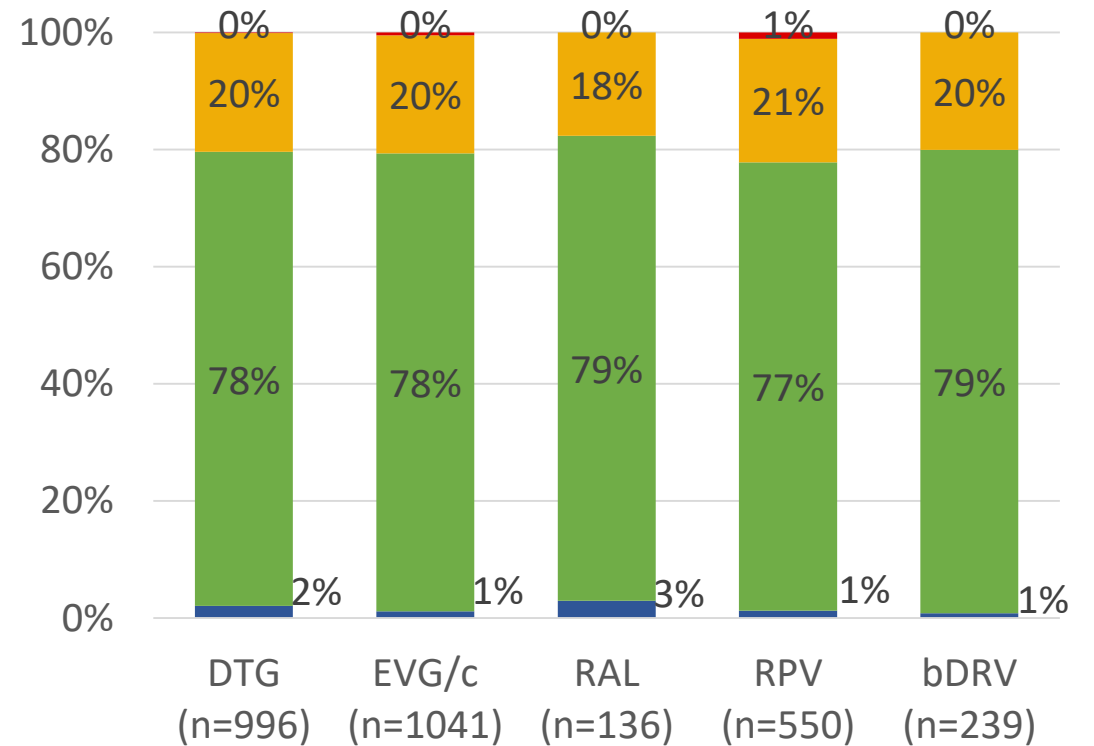
12-month BMI among normal weight PLWH at baseline

■ Underweight (BMI <18.5) ■ Normal (BMI ≥18.5 to <25) ■ Overweight (BMI ≥25 to <30) ■ Obese (BMI ≥30)

Baseline



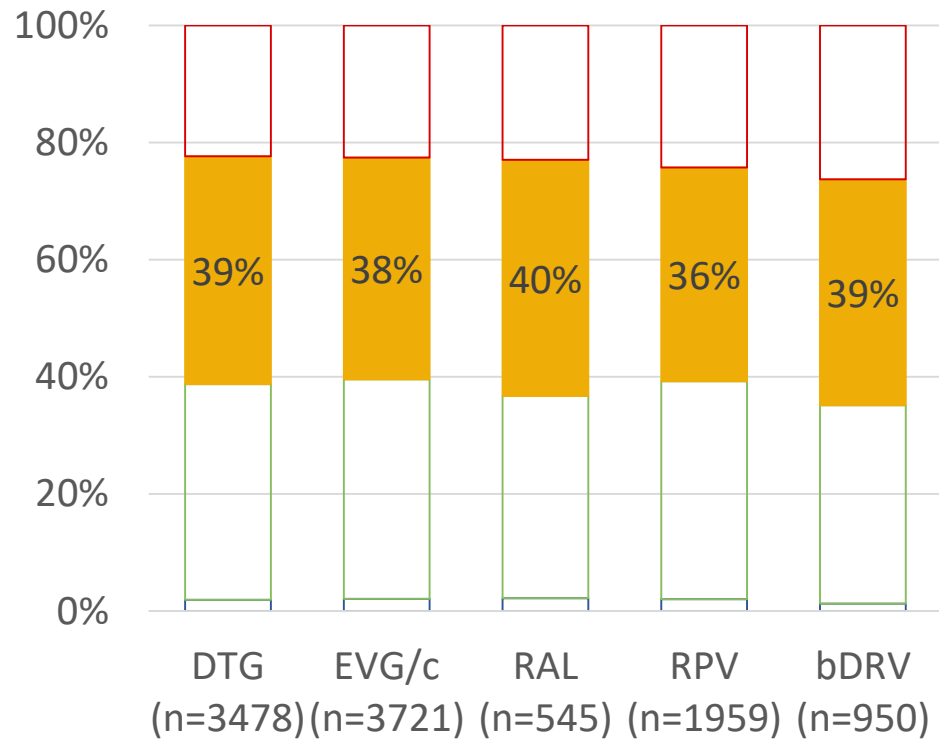
12-month



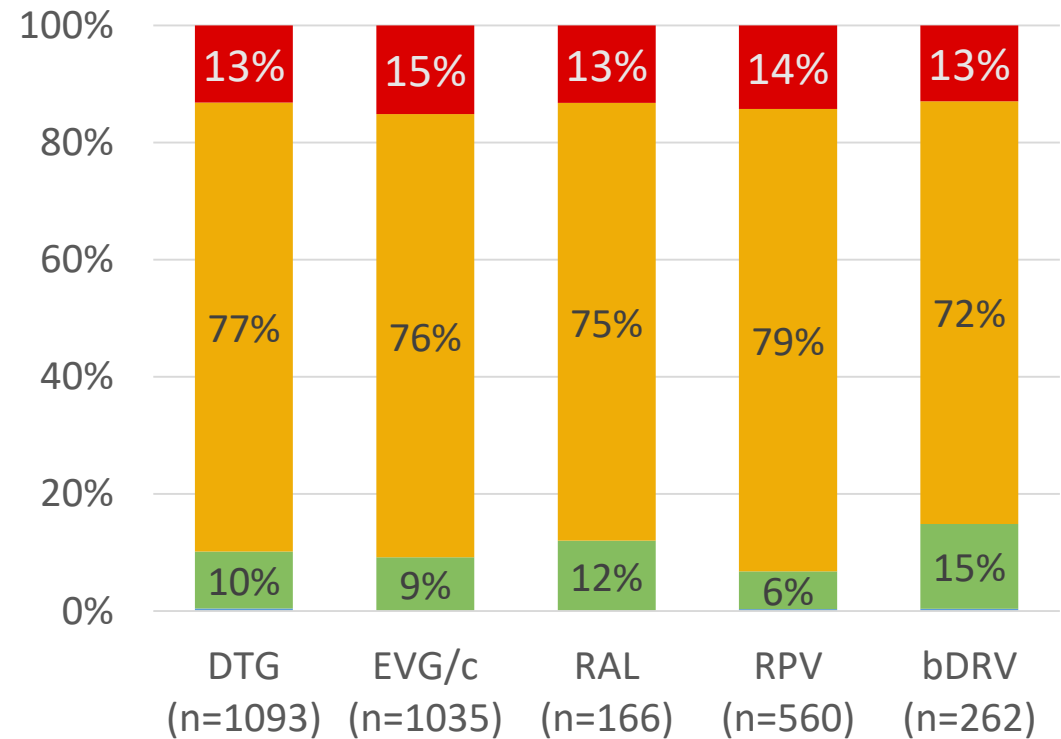
12-month BMI among overweight PLWH at baseline

■ Underweight (BMI <18.5) ■ Normal (BMI ≥18.5 to <25) ■ Overweight (BMI ≥25 to <30) ■ Obese (BMI ≥30)

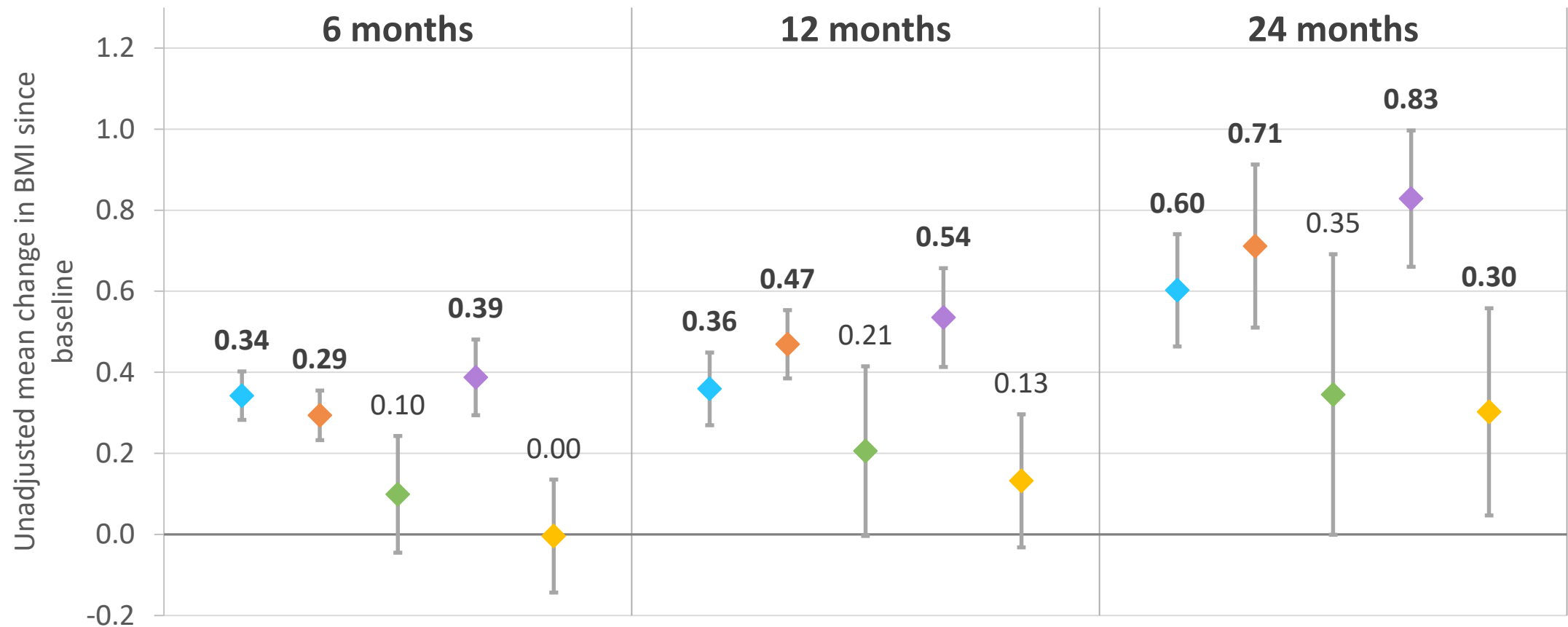
Baseline



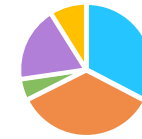
12-month



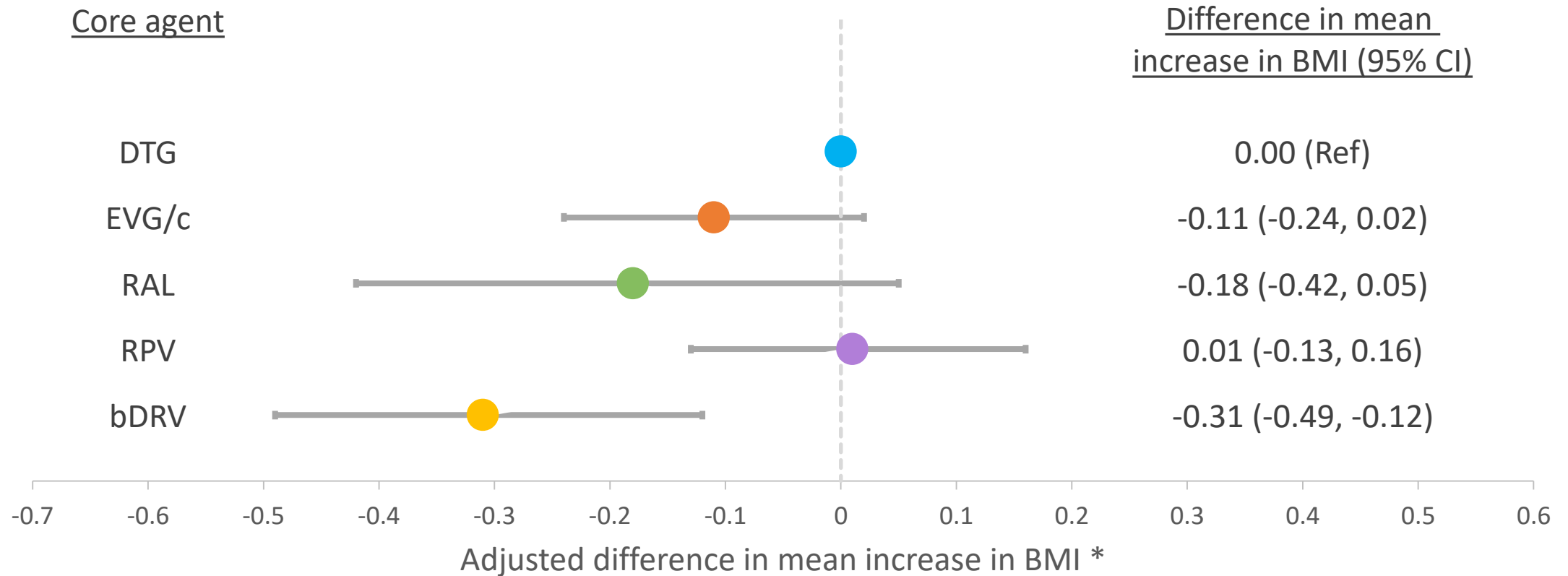
Unadjusted change in BMI (kg/m²) since core agent initiation



12-month adjusted difference in mean increase in BMI from baseline

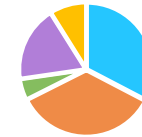


■ DTG ■ EVG/c ■ RAL ■ RPV ■ bDRV



* Adjusted for baseline age, sex, race/ethnicity, BMI, lipodystrophy, endocrine disorders, hypertension, substance abuse, weight-gain associated medication, weight-loss associated medication, CD4 cell count, viral load, and TAF use

6-, 12-, 24-month adjusted difference in mean increase in BMI from baseline

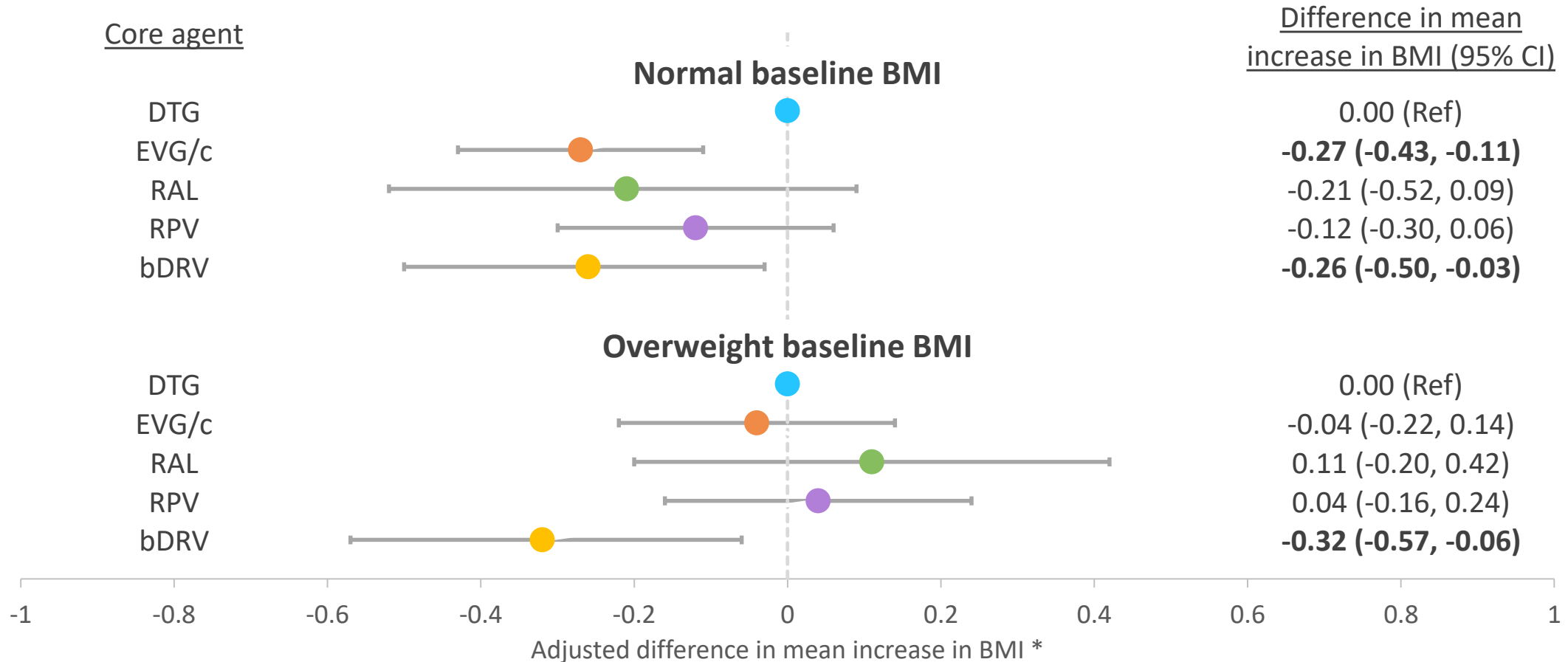


■ DTG ■ EVG/c ■ RAL ■ RPV ■ bDRV

	6-month adjusted difference in mean increase in BMI N = 9,980	12-month adjusted difference in mean increase in BMI N = 8,143	24-month adjusted difference in mean increase in BMI N = 4,436
DTG	0.00 (Ref)	0.00 (Ref)	0.00 (Ref)
EVG/c	-0.15 (-0.25, -0.06)	-0.11 (-0.24, 0.02)	-0.06 (-0.26, 0.13)
RAL	-0.22 (-0.39, -0.06)	-0.18 (-0.42, 0.05)	-0.25 (-0.60, 0.10)
RPV	0.01 (-0.09, 0.12)	0.01 (-0.13, 0.16)	0.09 (-0.12, 0.31)
bDRV	-0.30 (-0.44, -0.17)	-0.31 (-0.49, -0.12)	-0.29 (-0.57, -0.01)

* Adjusted for baseline age, sex, race/ethnicity, BMI, lipodystrophy, endocrine disorders, hypertension, substance abuse, weight-gain associated medication, weight-loss associated medication, CD4 cell count, viral load, and TAF use

12-month adjusted difference in mean increase in BMI, by baseline BMI

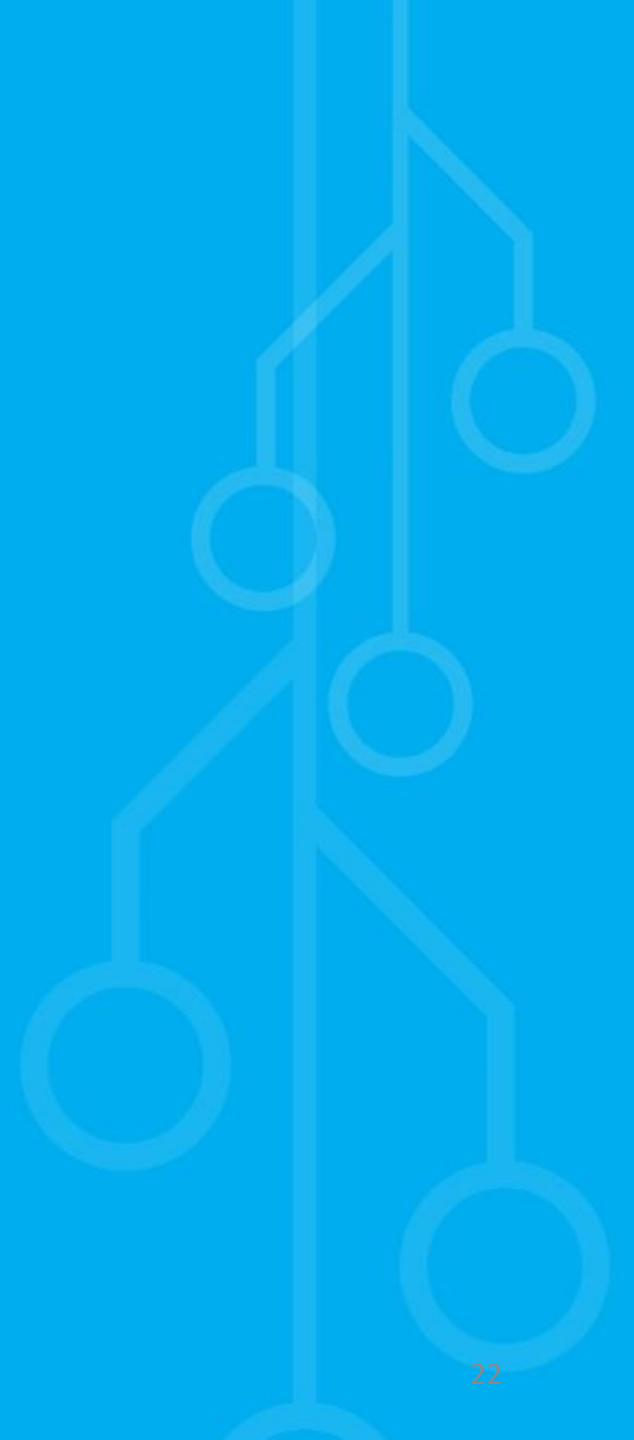


* Adjusted for baseline age, sex, race/ethnicity, BMI, lipodystrophy, endocrine disorders, hypertension, substance abuse, weight-gain associated medication, weight-loss associated medication, CD4 cell count, viral load, and TAF use

Summary of findings

Lower increases in mean BMI compared to DTG					
		EVG/c vs. DTG	RAL vs. DTG	RPV vs. DTG	bDRV vs. DTG
Overall	6 -month	↓	↓	≈	↓
	12-month	≈	≈	≈	↓
	24-month	≈	≈	≈	↓
Normal baseline BMI	12-month	↓	≈	≈	↓
Overweight at baseline	12-month	≈	≈	≈	↓

Discussion



Discussion

- Increases in BMI persist in treatment-experienced, suppressed patients
 - Return to health does not fully explain weight gain associated with ART
- Small absolute increases in BMI with all core agents
 - Statistically significant for DTG, EVG/c, RPV
- Although both weight gain and weight loss were observed across all groups, the trend remains an increase in BMI over time

Strengths

- + ART experience suppressed PLWH: eliminates impact of return to health
- + Large sample size in each of the treatment groups (545 to 3,721 PLWH), for a total of 10,653 PLWH
- + Adjusted for multiple concurrent medications associated with weight gain, including TAF
- + Electronic medical records
 - Availability of lab results
 - Ability to identify and account for history of disorders
- + Results robust to sensitivity analyses (IPCW, stratification by baseline BMI)

Limitations

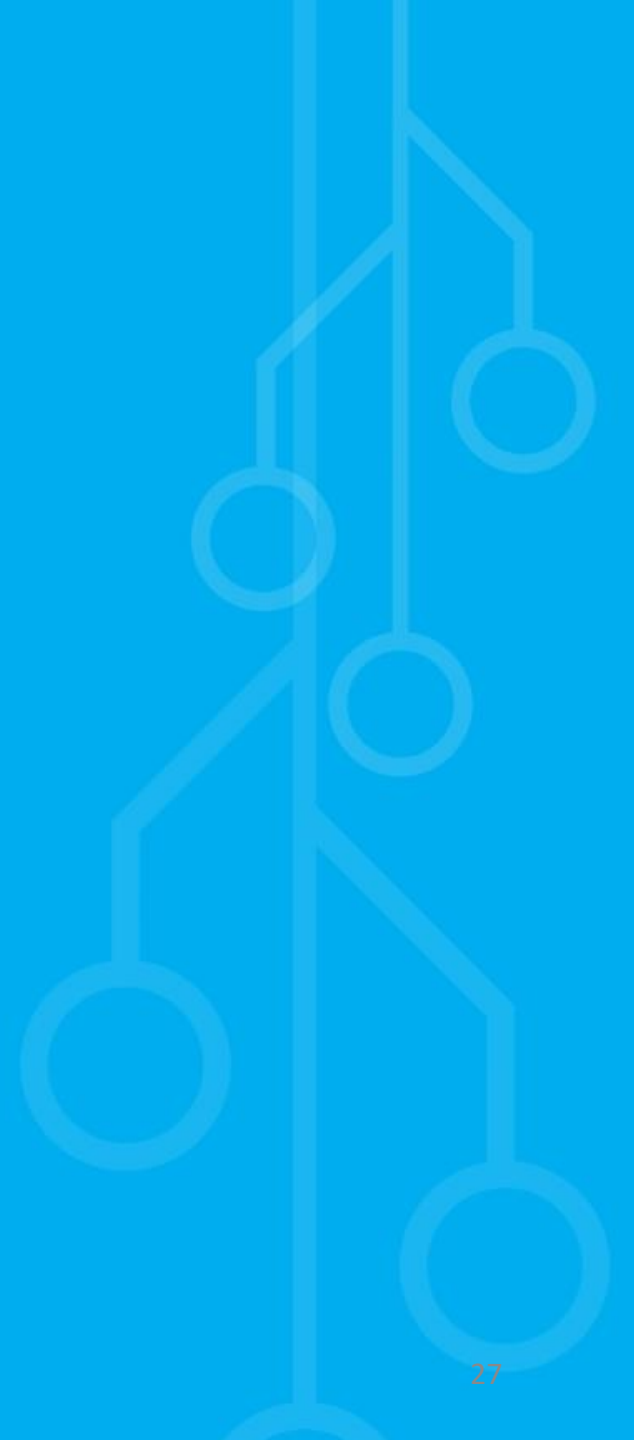
- Exclusion of PLWH without BMI measured during specific time windows
 - Different population in each model
- Strong assumption of linearity made by assessing changes in BMI at 3 subsequent time points in different models
- No adjustment for:
 - Marijuana or marinol use
 - Time-updated covariates
- Insufficient number of BIC users at the time of the study

Acknowledgements

- This research would not be possible without the participation of people living with HIV and their caregivers
- I am grateful for the following contributions: Robin Beckerman (SAS programming), Jeff Briney (QA), Bernie Stooks (Database Arch & Mgmt), Judy Johnson (Med Terminology Classification), Rodney Mood (Site Support)
- This research was sponsored by ViiV Healthcare



Additional slides

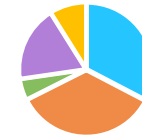


Extreme weight gain (>10% increase from baseline weight), unadjusted



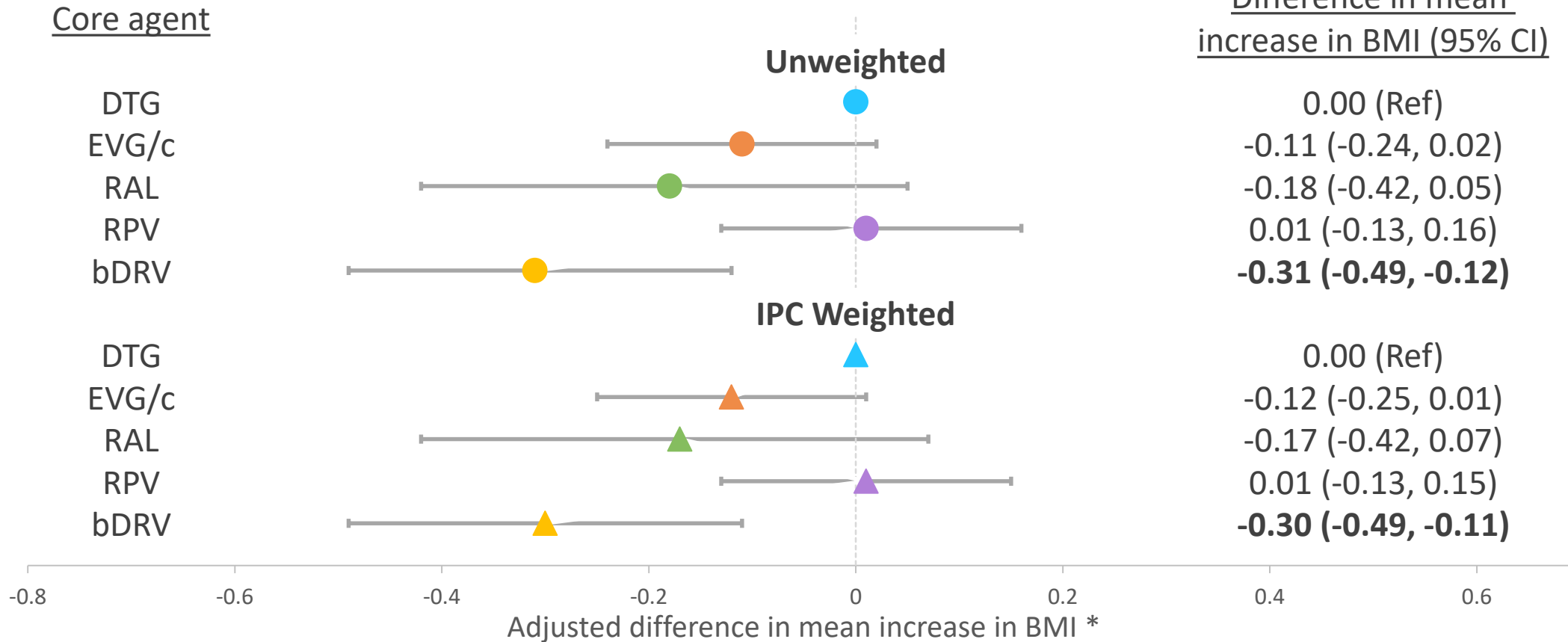
	>10% weight increase at 6-month	>10% weight increase at 12-month	>10% weight increase at 24-month
DTG	173/3,273 (5.3%)	239/2,757 (8.7%)	231/1,548 (14.9%)
EVG/c	178/3,484 (5.1%)	280/2,774 (10.1%)	209/1,506 (13.9%)
RAL	16/513 (3.1%)	28/402 (7.0%)	25/217 (11.5%)
RPV	99/1,830 (5.4%)	157/1,513 (10.4%)	121/795 (15.2%)
bDRV	37/880 (4.2%)	53/697 (7.6%)	43/370 (11.6%)

12-month adjusted difference in mean increase in BMI from baseline



■ DTG ■ EVG/c ■ RAL ■ RPV ■ bDRV

Difference in mean increase in BMI (95% CI)



* Adjusted for baseline age, sex, race/ethnicity, BMI, lipodystrophy, endocrine disorders, hypertension, substance abuse, weight-gain associated medication, weight-loss associated medication, CD4 cell count, viral load, and TAF use

6-, 12-, 24-month IPCW adjusted difference in mean increase in BMI from baseline

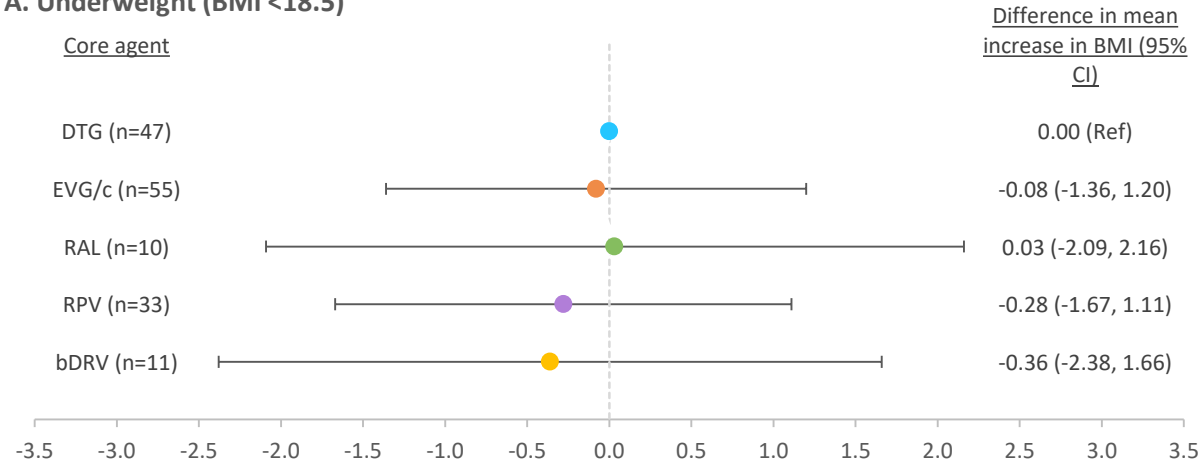


	6-month adjusted difference in mean increase in BMI	12-month adjusted difference in mean increase in BMI	24-month adjusted difference in mean increase in BMI
DTG	0.00 (Ref)	0.00 (Ref)	0.00 (Ref)
EVG/c	-0.15 (-0.24, -0.06)	-0.12 (-0.25, 0.01)	-0.08 (-0.26, 0.11)
RAL	-0.18 (-0.33, -0.02)	-0.17 (-0.42, 0.07)	-0.24 (-0.60, 0.11)
RPV	0.00 (-0.10, 0.11)	0.01 (-0.13, 0.15)	0.09 (-0.12, 0.31)
bDRV	-0.28 (-0.42, -0.14)	-0.30 (-0.49, -0.11)	-0.30 (-0.58, -0.01)

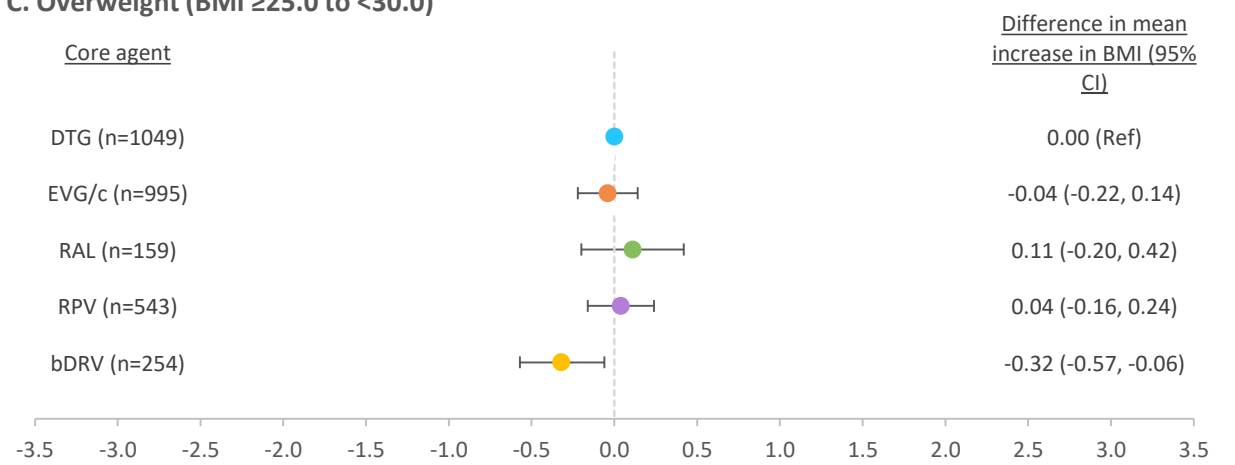
* Adjusted for baseline age, sex, race/ethnicity, BMI, lipodystrophy, endocrine disorders, hypertension, substance abuse, weight-gain associated medication, weight-loss associated medication, CD4 cell count, viral load, and TAF use

12-month adjusted difference in mean increase in BMI, by baseline BMI

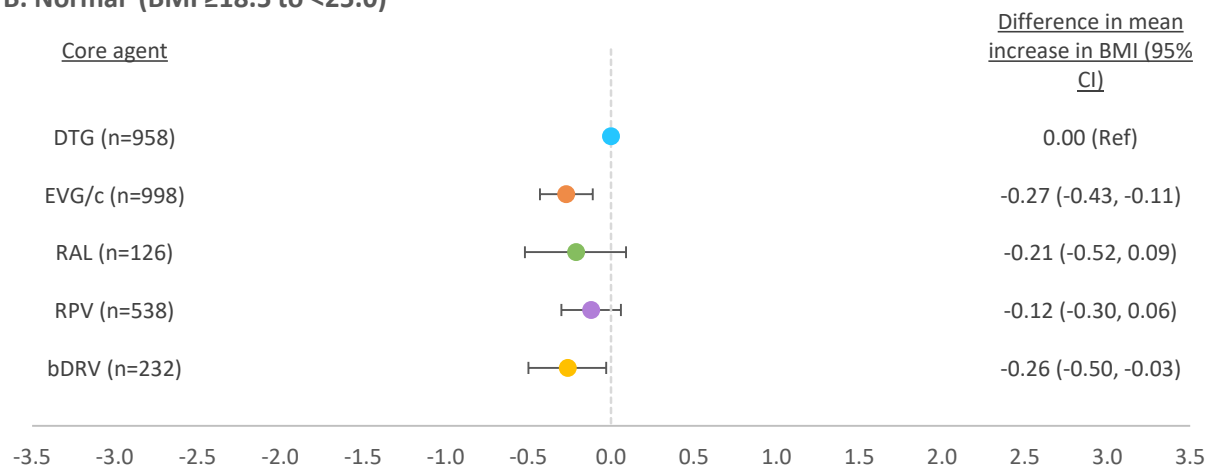
A. Underweight (BMI <18.5)



C. Overweight (BMI ≥25.0 to <30.0)



B. Normal (BMI ≥18.5 to <25.0)



D. Obese (BMI ≥30.0)

