Gilead Sciences, Inc. is providing this document to you, a US Healthcare Professional, in response to your unsolicited request for medical information.

GILEAD | Medical Information

Biktarvy® (BIC/FTC/TAF) Treatment-Emergent RAMs

This document is in response to your request for information regarding the use of Biktarvy® (bictegravir/emtricitabine/tenofovir alafenamide [BIC/FTC/TAF]) and treatment-emergent, resistance-associated mutations (RAMs). This response was developed according to principles of evidence-based medicine and includes data from Gilead-sponsored phase 3 clinical trials with BIC/FTC/TAF as the innovation arm and multicenter real-world studies with available data on treatment-emergent RAMs (N≥500).

Some data may be outside of the US FDA-approved prescribing information. In providing this data, Gilead Sciences, Inc. is not making any representation as to its clinical relevance or to the use of any Gilead product(s). For information about the approved conditions of use of any Gilead drug product, please consult the FDA-approved prescribing information.

The full indication, important safety information, and boxed warnings are available at: www.gilead.com/-/media/files/pdfs/medicines/hiv/biktarvy/biktarvy_pi.

Summary

Gilead Phase 3 Clinical Trial Data on BIC/FTC/TAF Use and Treatment-Emergent RAMs

No treatment-emergent RAMs were detected in >3000 PWH who received BIC/FTC/TAF in Gilead-sponsored phase 3 clinical trials.[1-10]

Real-World Data on BIC/FTC/TAF Use and Treatment-Emergent RAMs

In a retrospective study that used data from the HealthVerity database to assess the incidence of treatment-emergent RAMs among PWH who received oral ARV treatment, including BIC/FTC/TAF (n=108,721), from 2018 to 2024, the incidence of RAMs was 280/108,721 with BIC/FTC/TAF. Overall adherence was high in 68% of patients who received BIC/FTC/TAF; among patients who developed RAMs, adherence in the 90 days prior to RAM outcome was high in 15% of patients, mixed in 8%, and low in 77%.[11]

In a retrospective study that used data from a national French database of genotypic resistance assays to assess treatment-emergent resistance in PWH, including those who received BIC/FTC/TAF (N=3383), 3% of participants (6/203) who received BIC/FTC/TAF and had confirmed VF developed treatment-emergent RAMs (M184V, n=4; dual INSTI and M184V, n=2).[12]

In BICSTaR, an ongoing, multicountry, prospective, observational cohort study in PWH that is evaluating the effectiveness and safety of BIC/FTC/TAF in clinical practice, no treatment-emergent RAMs to the components of BIC/FTC/TAF were detected at 24 months (ARV-naive, n=483; TE, n=1591), 36 months (ARV-naive, n=67; TE, n=382), 4 years (ARV-naive, n=125; TE, n=675), or 5 years (ARV-naive, n=132; TE, n=691).[13-16]

Gilead Phase 3 Clinical Trial Data on BIC/FTC/TAF Use and Treatment-Emergent RAMs

No treatment-emergent RAMs were detected in >3000 PWH treated with BIC/FTC/TAF in Gilead-sponsored phase 3 clinical trials (Table 1).[1-10,17]

Table 1. Treatment-Emergent RAMs in BIC/FTC/TAF Phase 3 Clinical Trials (BIC/FTC/TAF-Treated Participants)[1-10,17]

Trial	Population	N[a]	Drugs With Excluded Resistance[b]	Treatment-Emergent RAMs[c]
GS-US-380-1489[1]	ARV-naive adults	314/254	FTC, TFV, ABC, and 3TC[18]	No
GS-US-380-1490[1]	ARV-naive adults	320/265	FTC and TFV[19]	No
GS-US-380-1878[2]	VS adults	290/244	FTC, TFV, ABC, and 3TC	No
GS-US-380-1844[3]	VS adults	284/265	FTC, TFV, DTG, ABC, and 3TC[20]	No
GS-US-380-4030[4]	VS adults	284	INSTI	No
GS-US-380-1961[5]	VS adult women	234/228	FTC, TFV, ATV, and EVG[21]	No
BRAAVE 2020[6] GS-US-380-4580	VS adults self-identifying as Black or African American	330/163	INSTI and specific NRTI RAMs (ie, K65R/E/N, T69 insertions, ≥3 TAMs)	No
GS-US-380-1474[7,8]	VS adolescents and children	122	FTC, TFV, and INSTI[22]	No
GS-US-380-4449[9]	VS adults ≥65 years of age	86	FTC, TFV, and BIC[22]	No
ALLIANCE GS-US-380-4458[10]	ARV-naive adults with HIV and HBV	119/89	FTC and TFV[17]	No

Abbreviations: 3TC=lamivudine; ABC=abacavir; ATV=atazanavir; DTG=dolutegravir; EVG=elvitegravir; TAM=thymidine analog mutation; TFV=tenofovir; VS=virologically suppressed.
[a]Total number of participants includes those randomly assigned to receive BIC/FTC/TAF at baseline/those who later switched to BIC/FTC/TAF if the study included an extension phase.
[b]The trial excluded participants with resistance to the drugs listed.
[c]Resistance testing performed for participants with confirmed viremia with second HIV-1 RNA ≥200 c/mL or ≥200 c/mL at last visit, with no resuppression of HIV-1 RNA to <50 c/mL while on study drug.

Real-World Data on BIC/FTC/TAF Use and Treatment-Emergent RAMs

Retrospective Study of RAMs With BIC/FTC/TAF[11]

A retrospective study using data from the HealthVerity database assessed the incidence of treatment-emergent RAMs in adult PWH on oral ARV treatment, including BIC/FTC/TAF (n=108,721), from 2018 to 2024. Outcomes included newly detected RAMs after ≥90 days on one of the index regimens, mutations associated with resistance to ≥1 component of the regimen, associated viremia (HIV-1 RNA ≥200 c/mL), and adherence during the 90 days leading up to RAM detection, as assessed by PDC.

The unweighted incidence of RAMs with BIC/FTC/TAF was 280/108,721. Among all patients who received BIC/FTC/TAF, 68% had high adherence (PDC, 85–100%), 15% had mixed adherence (PDC, 65–84%), and 17% had low adherence (PDC, <65%). Among patients who

received BIC/FTC/TAF and developed RAMs, adherence in the 90 days prior to RAM outcome was high in 15% of patients, mixed in 8%, and low in 77%.

French National Database Study[12]

A multicenter, retrospective, observational study used data from a French national database of genotypic resistance assays to assess treatment-emergent resistance in PWH, including those who received BIC/FTC/TAF (N=3383). Included were adults with a history of ≥1 ARV regimen with genotypic resistance assay results from either the first-line ARV regimen or the last confirmed VF (two consecutive HIV-1 viral loads >50 c/mL) between January 2022 and December 2024. The primary outcome was the proportion of treatment-emergent RAMs in patients with confirmed VF, and secondary outcomes included treatment-emergent INSTI RAMs and NRTI RAMs in patients who received BIC/FTC/TAF.

Over 3 years of follow-up, the incidence of confirmed VF with BIC/FTC/TAF was 6% (203/3383); of those patients, treatment-emergent RAMs were detected in 3% (6/203). Of the 6 patients with treatment-emergent RAMs, 4 patients (67%) had the NRTI RAM M184V alone, and 2 (33%) had dual INSTI (E138K or N155H) and M184V RAMs.

BICSTaR Study

BICSTaR is a Gilead-sponsored, ongoing, multicountry, prospective, observational cohort study in PWH that is evaluating the effectiveness, safety, and tolerability of BIC/FTC/TAF in clinical practice. ARV-naive (n=483) and TE (n=1591) PWH were evaluated in a 24-month pooled analysis of data from clinical sites in Europe, Canada, Israel, Asia, and Japan (June 27, 2018–December 20, 2023). Pooled analyses of data collected through 36 months (data cutoff, August 12, 2022; ARV-naive, n=67; TE, n=382), 4 years (data cutoff, September 1, 2023; ARV-naive, n=125; TE, n=675), and 5 years (data cutoff, June 24, 2024; ARV-naive, n=132; TE, n=691) from clinical sites in Germany, France, and Canada were also conducted. No treatment-emergent RAMs to the components of BIC/FTC/TAF were detected at 24 months, 36 months, 4 years, or 5 years.[13-16]

References

1. Orkin C, Antinori A, Rockstroh JK, et al. Switch to bictegravir/emtricitabine/tenofovir alafenamide from dolutegravir-based therapy. *AIDS.* 2024;38(7):983-991.
2. Rockstroh JK, Molina JM, Post F, et al. Long-Term Follow-Up After a Switch to Bictegravir, Emtricitabine, Tenofovir Alafenamide (B/F/TAF) from a Boosted Protease Inhibitor-Based Regimen [Poster P036]. Paper presented at: HIV GLASGOW Drug Therapy Virtual; 05-08 October, 2020; Glasgow, UK.
3. Brar I, Ruane PJ, Berhe M, et al. Efficacy and safety of switch to bictegravir/emtricitabine/tenofovir alafenamide from dolutegravir/abacavir/lamivudine: Results from an open-label extension of a phase 3 randomized, double-blind, multicenter, active-controlled, non-inferiority study. *Medicine.* 2025;104(8):e41482.
4. Sax PE, Rockstroh JK, Luetkemeyer AF, et al. Switching to bictegravir, emtricitabine, and tenofovir alafenamide in virologically suppressed adults with Human Immunodeficiency Virus. *Clin Infect Dis.* 2020:1-9.
5. Kityo C, Hagins D, Koeing E, et al. Longer-term (96-week) Efficacy and Safety of Switching to Bictegravir, Emtricitabine and Tenofovir Alafenamide (B/F/TAF) in Women [Presentation]. Paper presented at: 10th IAS Conference on HIV Science (IAS 2019); 21-24 July, 2019; Mexico City, Mexico.
6. Andreatta K, D'Antoni ML, Chang S, et al. High efficacy of bictegravir/emtricitabine/tenofovir alafenamide (B/F/TAF) in Black adults in the United States, including those with pre-existing HIV resistance and suboptimal adherence. *J Med Virol.* 2024;96(10):e29899.

7. Natukunda E, Rodriguez CA, McGrath EJ, et al. B/F/TAF In Virologically Suppressed Adolescents and Children: Two-year Outcomes in 6 to <18 Year Olds and Six-month Outcomes in Toddlers [Presentation]. Paper presented at: International Workshop on HIV & Pediatrics; July 16-17, 2021; Virtual.
8. Rodriguez CA, Strehlau R, Chokephaibulkit K, et al. One Year Outcome of Bictegravir/Emtricitabine/Tenofovir Alafenamide (B/F/TAF) in Virologically Suppressed Children ≥ 2 Years Weighing 14 to < 25 kg [Presentation]. Paper presented at: International Workshop on HIV & Pediatrics; 27-28 July, 2022; Montreal, Quebec, Canada.
9. Maggiolo F, Rizzardini G, Molina JM, et al. Bictegravir/emtricitabine/tenofovir alafenamide in older individuals with HIV: Results of a 96-week, phase 3b, open-label, switch trial in virologically suppressed people >/=65 years of age. *HIV Med.* 2022.
10. D'Antoni ML, Boopathy AV, Andreatta K, et al. Brief Report: HIV-1 Resistance Analysis of Participants With HIV-1 and Hepatitis B Receiving Bictegravir/Emtricitabine/Tenofovir Alafenamide or Dolutegravir Plus Emtricitabine/Tenofovir Disoproxil Fumarate Through the Open-Label Extension of the ALLIANCE Study. *J Acquir Immune Defic Syndr.* 2025;100(4):342-346.
11. Levintow SN, McDwyer P, Yin Z, Wang W, D'Antoni ML, Lim T. Incidence of Resistance-Associated Mutations Among People With HIV Receiving B/F/TAF Versus DTG-Based Regimens [Poster P-1059]. Paper presented at: IDWeek; October 21-24, 2026; Washington, DC.
12. Marcelin A-G, Soulie C, Wirden M, et al. Antiretroviral resistance in at least second-line HIV-1 treatment virologic failure with common InSTI-based regimens. *AIDS.* 2026;40(6):803-810.
13. Trottier B, Yang CJ, Watanabe D, et al. Bictegravir/emtricitabine/tenofovir alafenamide in clinical practice for people with HIV: final 24-month effectiveness and safety outcomes in key populations in the observational BICSTaR cohort. *HIV Res Clin Pract.* 2025;26(1):2456890.
14. Sabranski M, Vassallo M, Wet J, et al. Bictegravir/Emtricitabine/Tenofovir Alafenamide (B/F/TAF) in Antiretroviral Treatment Naïve (TN) and Experienced (TE) People With HIV (PWH): 3 Year Effectiveness and Safety Outcomes in the BICST a R Observational Cohort. [Poster eP.A.081]. Paper presented at: The 19th European AIDS Conference; October,18–21, 2023; Warsaw, Poland.
15. Wong A, Beer D, Duvivier C, et al. Four-Year Outcomes From the BICSTaR Study: Observational Analysis of B/F/TAF in Treatment-Naïve and Treatment-Experienced People With HIVin Canada, France, and Germany [Poster P063]. Paper presented at: HIV Glasgow; November 10–13, 2024; Glasgow, UK.
16. de Wet J, Lee M, Rieke A, et al. Five-Year Extended Follow-Up of the Observational BICSTaRCohort: Final Analysis in People With HIV Receiving Bictegravir/Emtricitabine/Tenofovir Alafenamide (B/F/TAF) in Routine Clinical Practice [Poster MeP05.3]. Paper presented at: European AIDS Conference (EACS); 15-18 October, 2025; Paris, France.
17. Avihingsanon A, Lu H, Leong CL, et al. Bictegravir, emtricitabine, and tenofovir alafenamide versus dolutegravir, emtricitabine, and tenofovir disoproxil fumarate for initial treatment of HIV-1 and hepatitis B coinfection (ALLIANCE): a double-blind, multicentre, randomised controlled, phase 3 non-inferiority trial [Main Article + Supplementary Appendix]. *The Lancet HIV.* 2023:1-13.
18. Gallant J, Lazzarin A, Mills A, et al. Bictegravir, Emtricitabine, and Tenofovir Alafenamide Versus Dolutegravir, Abacavir, and Lamivudine for Initial Treatment of HIV-1 Infection (GS-US-380-1489): A Double-Blind, Multicentre, Phase 3, Randomised Controlled Non-Inferiority Trial. *Lancet.* 2017;390:2063-2072.
19. Sax PE, Pozniak A, Montes ML, et al. Coformulated Bictegravir, Emtricitabine, and Tenofovir Alafenamide Versus Dolutegravir With Emtricitabine and Tenofovir Alafenamide, For Initial Treatment of HIV-1 Infection (GS-US-380-1490): A Randomised, Double-Blind, Multicentre, Phase 3, Non-Inferiority Trial. *Lancet.* 2017;390:2073-2082.
20. Brar I, Ruane P, Ward D, et al. Long-term Follow-up After a Switch to Bictegravir, Emtricitabine, and Tenofovir Alafenamide From Dolutegravir, Abacavir, and Lamivudine [Poster 1028]. Paper presented at: IDWeek Virtual; 21-25 October, 2020.
21. Kityo C, Hagins D, Koenig E, et al. Switching to Fixed-Dose Bictegravir, Emtricitabine, and Tenofovir Alafenamide (B/F/TAF) in Virologically Suppressed HIV-1 Infected Women: A Randomized, Open-Label, Multicenter, Active-Controlled, Phase 3, Noninferiority Trial. *J Acquir Immune Defic Syndr.* 2019;82(3):321-328.

Gilead Sciences, Inc. is providing this document to you, a US Healthcare Professional, in response to your unsolicited request for medical information.

22. Andreatta K, Acosta R, D'Antoni ML, et al. Sustained Viral Suppression After Switch to Bictegravir/Emtricitabine/Tenofovir Alafenamide Among Clinical Trial Participants With Preexisting M184V/I [Poster P123]. Paper presented at: HIV GLASGOW Drug Therapy Virtual; 05-08 October, 2020; Glasgow, UK.

Abbreviations

ARV=antiretroviral
BIC=bictegravir
BICSTaR=BIC Single Tablet Regimen
c/mL=copies/mL
FTC=emtricitabine
INSTI=integrase strand transfer inhibitor
MTR=multitablet regimen
NRTI=nucleos(t)ide reverse transcriptase inhibitor
PDC=percentage of days covered
PWH=people with HIV-1
RAM=resistance-associated mutation
TAF=tenofovir alafenamide
TE=treatment experienced
VF=virologic failure

Product Label

For the full indication, important safety information, and boxed warning(s), please refer to the Biktarvy US Prescribing Information available at: www.gilead.com/-/media/files/pdfs/medicines/hiv/biktarvy/biktarvy_pi.

Follow-Up

For any additional questions, please contact Gilead Medical Information at:

☎1-866-MEDI-GSI (1-866-633-4474) or 🖱 www.askgileadmedical.com

Adverse Event Reporting

Please report all adverse events to:

Gilead Global Patient Safety ☎ 1-800-445-3235, option 3 or
🖱 https://www.gilead.com/utility/contact/report-an-adverse-event

FDA MedWatch Program by ☎ 1-800-FDA-1088 or ✉MedWatch, FDA, 5600 Fishers Ln, Rockville, MD 20852 or 🖱 www.accessdata.fda.gov/scripts/medwatch

Data Privacy

The Medical Information service at Gilead Sciences may collect, store, and use your personal information to provide a response to your medical request. We may share your information with other Gilead Sciences colleagues to ensure that your request is addressed appropriately. If you report an adverse event or concern about the quality of a Gilead or Kite product, we will need to use the information you have given us in order to meet our regulatory requirements in relation to the safety of our medicines.

It may be necessary for us to share your information with Gilead's affiliates, business partners, service providers, and regulatory authorities located in countries besides your own. Gilead Sciences has implemented measures to protect the personal information you provide. Please see the Gilead Privacy Statement (www.gilead.com/privacy-statements) for more information about how Gilead handles your personal information and your rights. If you have any further questions about the use of your personal information, please contact gilead.privacy@gilead.com.

BIKTARVY, GILEAD, and the GILEAD logo are registered trademarks of Gilead Sciences, Inc., or its related companies.
© 2026 Gilead Sciences, Inc.