NATIONAL LGBTQIA+ HEALTH EDUCATION CENTER
A PROGRAM OF THE FENWAY INSTITUTE

HIV and Diabetes Mellitus

May 2021

Human immunodeficiency virus (HIV) infection and diabetes mellitus (DM) affect 1.2 and 34.2 million people, respectively, in the United States [1, 2]. Approximately 10% of people with HIV also have DM3. Type 2 DM is more common than type 1 DM and is the focus of this fact sheet. Clinicians caring for people with HIV must be prepared to screen for and manage DM and to counsel patients at risk for DM about DM prevention.

What is the relationship between HIV, antiretroviral therapy (ART), and DM?

- People with HIV tend to gain weight after starting ART[4].
- Weight gain is most prominent with integrase inhibitors, which are common components of first-line ART regimens in the United States[5].
- Weight gain is also greater with regimens containing tenofovir alafenamide (TAF) in comparison to tenofovir disoproxil fumarate (TDF)[6].
- Weight is a strong risk factor for DM, and as weight increases among people with HIV, the risk for DM increases more than among HIV-uninfected people at similar weights[7].

How can DM be prevented among people with HIV?

- A randomized controlled trial not focused on people with HIV showed that lifestyle interventions (losing at least 7% of weight, maintaining weight loss, and at least 150 minutes of physical activity per week) and metformin reduce progression to DM among people at risk for DM[8].
- Smaller studies suggest that these interventions are also effective among people with HIV[9,10].
- There is currently insufficient evidence to recommend ART changes for DM prevention among people who are virologically suppressed and otherwise tolerating ART well.

What are screening recommendations for DM among people with HIV?

- Categories of glucose homeostasis include[11]:

Category	Definition
Normal	• Fasting glucose < 100 mg/dL **OR** • 2-hour oral glucose tolerance test (OGTT) glucose < 140 mg/dL
Prediabetes	• Fasting glucose 100-125 mg/dL ("impaired fasting glucose") **OR** • 2-hour OGTT glucose 140-199 mg/dL ("impaired glucose tolerance") • Hemoglobin A1C 5.7-6.4%
Diabetes Mellitus	• Fasting glucose < 125 mg/dL • 2-hour OGTT glucose > 199 mg/dL • Hemoglobin A1C > 6.4%

- People with HIV should have a random glucose or hemoglobin A1C prior to starting ART; thereafter, only glucose criteria should be used to diagnose DM[12].
- Hemoglobin A1C may underestimate blood glucose in those taking ART[12].

How does HIV affect treatment of DM?

- DM treatment for people with HIV is generally the same as for HIV-uninfected people. Cornerstones of treatment include diet and lifestyle modifications, metformin, and other agents (e.g., GLP-1 agonists) if metformin alone is insufficient.
- Goal glucose levels are the same regardless of HIV status.
- Dolutegravir, a common integrase inhibitor, increases metformin levels[13]. In people taking dolutegravir, the dose of metformin should not exceed 1000 mg/day. Otherwise, drug interactions between ART and antidiabetic agents are uncommon.

NLHEC-57

References

1. Basic statistics. Centers for Disease Control and Prevention. 2021. Available at: https://www.cdc.gov/hiv/basics/statistics.html.
2. National Diabetes Statistics Report. Centers for Disease Control and Prevention. 2020. Available at: https://www.cdc.gov/diabetes/pdfs/data/statistics/national-diabetes-statistics-report.pdf.
3. Hernandez-Romieu AC, Garg S, Rosenberg ES, Thompson-Paul AM, Skarbinski J. BMJ Open Diabetes Res Care. 2017 Jan 5;5(1):e000304.
4. Koethe JR, Jenkins CA, Lau B, et al. Rising obesity prevalence and weight gain among adults starting antiretroviral therapy in the United States. AIDS Res Hum Retroviruses. 2016 Jan;32(1):50-58.
5. Norwood J, Turner M, Bofill C, et al. Brief report: Weight gain in persons with HIV switched from efavirenz-based to integrase-strand transfer inhibitor-based regimens. J Acquir Immune Defic Syndr. 2017 Dec 15;76(5):527-531.
6. Venter WDF, Sokhela S, Simmons B, et al. Dolutegravir with emtricitabine and tenofovir alafenamide or tenofovir disoproxil fumarate versus efavirenz, emtricitabine, and tenofovir disoproxil fumarate for initial treatment of HIV-1 infection (ADVANCE): week 96 results from a randomized, phase 3, non-inferiority trial. Lancet HIV. 2020 Oct;7(10):e666-e676.
7. Herrin M, Tate JP, Akgün KM, et al. Weight gain and incident diabetes among HIV-infected veterans initiating antiretroviral therapy compared with uninfected individuals. J Acquir Immune Defic Syndr. 2016 Oct 1;73(2):228-236.
8. Diabetes Prevention Program Research Group. Reduction in the incidence of type 2 diabetes with lifestyle intervention or metformin. N Engl J Med. 2002;346:393-403.
9. Fitch KV, Anderson EJ, Hubbard JL, et al. Effects of a lifestyle modification program in HIV-infected patients with the metabolic syndrome. AIDS. 2006 Sep 11;20(14):1843-1850.
10. Duncan AD, Peters BS, Rivas C, Goff LM. Reducing risk of type 2 diabetes in HIV: a mixed-methods investigation of the STOP-Diabetes diet and physical activity intervention. Diabet Med. 2020 Oct;37(10):1705-1714.
11. American Diabetes Association. Classification and diagnosis of diabetes. Diabetes Care. 2015;38 (Suppl. 1):S8-S16.
12. Thompson MA, Horberg MA, Agwu AL, et al. Primary care guidelines for persons with human immunodeficiency virus: 2020 update by the HIV Medicine Association of the Infectious Disease Society of America. Clin Infect Dis. 2020 Nov 6;ciaa1931.doi: 10.1093.
13. Song IH, Zong J, Borland J, et al. The effect of dolutegravir on the pharmacokinetics of metformin in healthy subjects. J Acquir Immune Defic Syndr. 2016 Aug 1;72(4):400-407.

The National LGBTQIA+ Health Education center is supported by the Health Resources and Services Administration (HRSA) of the U.S. Department of Health and Human Services (HHS) as part of award U30CS22742 totaling $700,000 with 0 percent financed with non-governmental sources. The contents are those of the author(s) and do not necessarily represent the official views of, nor an endorsement, by HRSA, HHS, or the U.S. Government. For more information, please visit HRSA.gov.