

Table 15h. Antiretroviral Therapy–Associated Adverse Effects and Management Recommendations—Lipodystrophies and Weight Gain

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Adverse Effects	Associated ARVs	Onset/ Clinical Manifestations	Estimated Frequency	Risk Factors	Prevention/ Monitoring	Management
Lipodystrophy (Fat Maldistribution) General Information	<ul style="list-style-type: none"> See below for specific associations. 	Onset <ul style="list-style-type: none"> Increase in trunk and limb fat is the first sign; peripheral fat wasting may not appear for 12–24 months after ART initiation. 	<ul style="list-style-type: none"> Frequency is low (<5%) with current regimens. 	<ul style="list-style-type: none"> Genetic predisposition Puberty HIV-associated inflammation Older age Longer duration of ART Body habitus 	Prevention <ul style="list-style-type: none"> Initiate a calorically appropriate low-fat diet and an exercise regimen. Monitoring <ul style="list-style-type: none"> BMI measurement Waist circumference and waist-hip ratio 	<ul style="list-style-type: none"> Physicians should perform a regimen review and consider changing the regimen when lipodystrophy occurs. Improvement in fat maldistribution can vary following a regimen change. Improvement may occur after several months or years, or it may not occur at all.
Central Lipohypertrophy or Lipo-Accumulation	<ul style="list-style-type: none"> Can occur in the absence of ART, but these conditions most often are associated with the use of PIs and EFV. 	Presentation <ul style="list-style-type: none"> Central fat accumulation with increased abdominal girth, which may include a dorsocervical fat pad (buffalo hump). Gynecomastia may occur in males, or breast hypertrophy may occur in females, particularly with the use of EFV. 	<ul style="list-style-type: none"> Frequency is low (<5%) with current regimens. 	<ul style="list-style-type: none"> Obesity before initiation of therapy Sedentary lifestyle 	Prevention <ul style="list-style-type: none"> Initiate a calorically appropriate low-fat diet and an exercise regimen. Monitoring <ul style="list-style-type: none"> BMI measurement Waist circumference and waist-hip ratio measurements 	<ul style="list-style-type: none"> Counsel patient on lifestyle modification and dietary interventions (e.g., maintaining a calorically appropriate diet that is low in saturated fats and simple carbohydrates and starting an exercise regimen, especially strength training). Recommend smoking cessation (if applicable) to decrease future CVD risk.

						<ul style="list-style-type: none"> Consider using an INSTI instead of a PI or EFV, although some INSTIs may be associated with generalized weight gain (see below). <p>Data Are Insufficient to Allow the Panel to Safely Recommend Use of Any of the Following Modalities in Children</p> <ul style="list-style-type: none"> Recombinant human growth hormone Growth hormone–releasing hormone Metformin Thiazolidinediones Recombinant human leptin Anabolic steroids Liposuction
Facial/Peripheral Lipoatrophy	<ul style="list-style-type: none"> Most cases are associated with the use of ZDV, a thymidine analogue NRTI. 	<p>Presentation</p> <ul style="list-style-type: none"> Thinning of subcutaneous fat in the face, buttocks, and extremities, measured as a decrease in trunk/limb fat by DXA or triceps skinfold thickness. Preservation of lean body mass distinguishes lipoatrophy from HIV-associated wasting. 	<ul style="list-style-type: none"> Frequency is low (<5%) with current regimens. 	<ul style="list-style-type: none"> Underweight before ART initiation 	<p>Prevention</p> <ul style="list-style-type: none"> Limit the use of ZDV. <p>Monitoring</p> <ul style="list-style-type: none"> Patient self-report and physical examination are the most sensitive methods of monitoring lipoatrophy. 	<ul style="list-style-type: none"> Replace ZDV with another NRTI when possible. <p>Data Are Insufficient to Allow the Panel to Safely Recommend Use of Any of the Following Modalities in Children</p> <ul style="list-style-type: none"> Injections of poly-L-lactic acid Recombinant human leptin Autologous fat

						transplantation • Thiazolidinediones
Weight Gain	<ul style="list-style-type: none"> Significant weight gain may occur with all ARV regimens, but it appears to be more pronounced with DTG, BIC, and TAF. 	Onset <ul style="list-style-type: none"> Gradual weight gain after initiating ARV drugs is common with all currently used regimens. The mechanism for weight gain is unclear and under investigation. 	<ul style="list-style-type: none"> Rate of development of obesity is unclear. 	In Infants and Children <ul style="list-style-type: none"> Have not been evaluated yet In Adolescents <ul style="list-style-type: none"> Female sex Pre-treatment obesity In Adults <ul style="list-style-type: none"> Low pre-treatment BMI Older age Female sex Black race 	Prevention <ul style="list-style-type: none"> Initiate a calorically appropriate low-fat diet and an exercise regimen. Monitoring <ul style="list-style-type: none"> BMI measurement Waist circumference and waist-hip ratio measurements 	<ul style="list-style-type: none"> Counsel patient on lifestyle modification and dietary interventions (e.g., maintaining a calorically appropriate healthy diet that is low in saturated fats and simple carbohydrates and starting an exercise regimen, especially strength training).

Key: ART = antiretroviral therapy; ARV = antiretroviral; BIC = bicitegravir; BMI = body mass index; CVD = cardiovascular disease; DTG = dolutegravir; DXA = dual energy X-ray absorptiometry; EFV = efavirenz; INSTI = integrase strand transfer inhibitor; NRTI = nucleoside reverse transcriptase inhibitor; PI = protease inhibitor; TAF = tenofovir alafenamide; ZDV = zidovudine

See the archived version of [Supplement III, February 23, 2009, Pediatric Guidelines](#) on the [Clinical info website](#) for a more complete discussion and reference list.

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