Table 13h. Antiretroviral Therapy-Associated Adverse Effects and Management Recommendations—Lipodystrophy, Lipohypertrophy, Lipoatrophy  *(Last updated April 27, 2017; last reviewed April 27, 2017)*  (page 1 of 2)

<table>
<thead>
<tr>
<th>Adverse Effects</th>
<th>Associated ARVs</th>
<th>Onset/ Clinical Manifestations</th>
<th>Estimated Frequency</th>
<th>Risk Factors</th>
<th>Prevention/ Monitoring</th>
<th>Management</th>
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<td>Lipodystrophy (Fat Maldistribution) General Information</td>
<td>See below for specific associations.</td>
<td>Onset: • Trunk and limb fat initially increase; peripheral fat wasting may not appear for 12 to 24 months after ART initiation.</td>
<td>Varies greatly depending upon measure and comparator group. <strong>Adults:</strong> • Up to 93% <strong>Children:</strong> • Up to 34%</td>
<td>Genetic predisposition Puberty HIV-associated inflammation Older age Longer duration of ART Body habitus</td>
<td>See below.</td>
<td>See below. A regimen review with consideration of changing the regimen should be considered, whenever present. Improvement following regimen change is variable, may take months to several years, or may not occur at all.</td>
</tr>
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<td>Central Lipohypertrophy or Lipoaccumulation</td>
<td>Can occur in the absence of ART, but most associated with PIs and EFV.</td>
<td>Presentation: • Central fat accumulation with increased abdominal girth, which may include dorsocervical fat pad (buffalo hump) and/or gynecomastia in males or breast hypertrophy in females, particularly with EFV.</td>
<td>Adults: • Up to 93% <strong>Children:</strong> • Up to 27%</td>
<td>Obesity before initiation of therapy Sedentary lifestyle</td>
<td>Prevention: • Calorically appropriate low-fat diet and exercise <strong>Monitoring:</strong> • BMI measurement • Body circumference and waist-hip ratio</td>
<td>Calorically appropriate healthy diet low in saturated fats and simple carbohydrates, and exercise, especially strength training Smoking cessation (if applicable) to decrease future CVD risk Consider switching from PIs and EFV to an INSTI. <strong>Data are Insufficient to Allow the Panel to Safely Recommend Use of Any of the Following Modalities in Children:</strong> • Recombinant human growth hormone • Growth hormone-releasing hormone • Metformin • Thiazolidinediones • Recombinant human leptin • Anabolic steroids • Liposuction</td>
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### Table 13h. Antiretroviral Therapy-Associated Adverse Effects and Management Recommendations—Lipodystrophy, Lipohypertrophy, Lipoatrophy  (Last updated April 27, 2017; last reviewed April 27, 2017) (page 1 of 2)

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| Facial/Peripheral Lipoatrophy | Most associated with thymidine analogue NRTIs (d4T > ZDV) | Presentation:  
- Thinning of subcutaneous fat in face, buttocks, and extremities, measured as decrease in trunk/limb fat by DXA or triceps skinfold thickness. Preservation of lean body mass distinguishes lipoatrophy from HIV-associated wasting. | Adults:  
- Up to 59%  
Children:  
- Up to 47%  
- Risk lower (up to 15%) in patients not treated with d4T or ZDV. | Underweight before ART | Prevention:  
- Avoid use of d4T and ZDV.  
Monitoring:  
- Patient self-report and physical exam are the most sensitive methods of monitoring lipoatrophy. | Replace d4T (no longer recommended) or ZDV with other NRTIs if possible.  
Data are Insufficient to Allow the Panel to Safely Recommend Use of Any of the Following Modalities in Children:  
- Injections of poly-L-lactic acid  
- Recombinant human leptin  
- Autologous fat transplantation  
- Thiazolidinediones |

**Key to Acronyms:** ART = antiretroviral therapy; ARV = antiretroviral; BMI = body mass index; CVD = cardiovascular disease; d4T = stavudine; DXA = dual energy x-ray absorptiometry; EFV = efavirenz; INSTI = integrase strand transfer inhibitor; NRTI = nucleoside reverse transcriptase inhibitor; PI = protease inhibitor; ZDV = zidovudine

### References

See the archived version of Supplement III, February 23, 2009 Guidelines for the Use of Antiretroviral Agents in Pediatric HIV Infection (https://www.aidsinfo.nih.gov) for a more complete discussion and reference list.

### General Reviews


**Associated ARVs/Etiology**


**Management**


