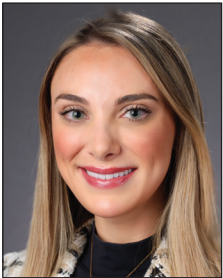


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#### Fat-reduction techniques

By Jasmine Humeda, MD, and Natalie Houston Daniels, MD, FAAD

Technique	Trade name	Mechanism of action	FDA-approval	Side effects/contraindications	Notes
Cryolipolysis	CoolSculpting®	Cold-induced apoptosis of adipose cells via crystallization → lobular panniculitis → lipid phagocytosis → smaller adipocyte size and wider fibrous septae	Visible fat bulges in submental & submandibular areas, thigh, abdomen, and flank, bra & back fat, underneath the buttocks (banana roll), and upper arm. Not indicated for weight loss	Paradoxical adipocyte hypertrophy, bruising, pain, temporary numbness, morphea, atrophy, cold panniculitis, fat necrosis, hernia formation CI: cryoglobulinemia, cold agglutinin disease, or paroxysmal cold hemoglobinuria, Hx of hernias	Manual massage post-treatment (can be most painful part of procedure) to rewarm and smooth out treated area and multiple treatments may lead to improved efficacy Results may be seen as early as 4 weeks with maximum results after 1-3 months
Deoxycholic acid injections (ATX-101)	KYBELLA®	Fat cell membrane degradation (adipocytolysis)	Submental fat contouring; off-label use includes jowl reduction, bra fat, suprapatellar fat pads	Pain, hematoma, edema/swelling, temporary marginal mandibular nerve injury, alopecia, numbness	Full results not apparent until 12 weeks post-therapy
Mesotherapy injections	None	Same as above; various pharmacologic, plant-based & vitamin-derived ingredients (e.g., PC + detergent solvent, lecithin, isoproterenol)	Not FDA-approved or regulated	Skin infections, panniculitis, scarring/ulceration	May be ineffective & unsafe; requires 3-15 treatments administered at 2-week intervals. The detergent solvent commonly used, deoxycholate, is most likely the active ingredient.
High-intensity focused ultrasound	LipoSonix™	Thermal destruction of adipocytes	Non-invasive waist circumference reduction	Pain, numbness, edema, ecchymoses	Results seen over 8-12-week period 2-3 cm waist circumference reduction after one treatment
Non-thermal focused ultrasound	UltraShape Power®	Cavitation disruption of adipocytes	Abdominal circumference reduction	Blistering from inadequate contact or use over bony areas	3 treatments recommended every 2 weeks (3-5 cm waist circumference reduction) Avoid excessive fat consumption during first 2 days post-procedure



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## Fat-reduction techniques

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Technique	Trade name	Mechanism of action	FDA-approval	Side effects/contraindications	Notes
Radio- frequency (mono-, uni-, bi-, tri-polar)	Vanquish Me™ Evolve®	Heat-induced apoptosis of adipocytes	Abdominal circumference reduction & skin tightening	Redness, edema, risk of focal atrophy CI: pregnancy, pacemakers, areas of active infection or cancer	Requires multiple treatments (4-6 or > weekly sessions)
Low-level light therapy	Emerald™ (532 nm) Zerona™ (635 nm diode laser), UltraSlim®(635 nm)	Photochemical membrane pore creation	Fat reduction around the waist, hips, thighs (Emerald™ cleared for BMI up to 40)	Temporary redness, tenderness, swelling	Requires multiple treatments (6 or >)
Laser therapy	SculpSure® (1060 nm)	Heat-induced lipolysis	Abdomen, flanks, back, inner & outer thighs, submental area (BMI up to 49)	Redness, edema, tissue firmness	Results may be seen as early as 6 weeks with maximum results by 3 months
Tumescent liposuction	None	Direct subcutaneous adipocyte extraction  Performed from the deep to the superficial fat layers using cross-tunneling technique under local anesthesia → major complications (bowel perforation, bleeding, death, respiratory failure, pulmonary embolism) vs. general anesthesia (conventional liposuction)	Improving localized adiposities not responsive to diet & exercise alone; lipomas, gynecomastia, axillary hyperhidrosis, lipodystrophy in HIV-infected patients, flap undermining, adiposis dolorosa (Dercum disease), insulin-induced lipohypertrophy, "Buffalo hump" due to Cushing syndrome Not indicated for weight loss or cellulite	Local: Breast enlargement (temporary), abdominal distension & pain, edema, hematoma/seroma, skin dimpling/lumpiness, panniculitis, infection, compartment syndrome, lidocaine toxicity, Systemic: blood loss, acute pulmonary edema, hypothermia, visceral perforation, TSS, DVT, fat embolism syndrome CI: cardiac implantations, severe obesity, pregnancy, bleeding disorders	Max lidocaine limit is 55 mg/kg (adjust down to 45 mg/kg for lean or elderly; concentration = 0.05-0.1% + 1:1,000,000 epinephrine) Limit fat removal to 4500-5000 mL per session done via cannula Autologous fat transfer - fat harvested from patient (via liposuction, can be frozen for later use, or specifically for the procedure) usually from abdomen, thighs, buttocks → injected into deep wrinkles or hands

CI = contraindications; Hx = history; PC = phosphatidylcholine; TSS = toxic shock syndrome; DVT= deep vein thrombosis

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