

Current Evidence in Nonsurgical Fat Reduction



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KEYWORDS

• Nonsurgical • Fat reduction • Cryolipolysis • Radiofrequency • Ultrasound • Deoxycholic acid

KEY POINTS

- Despite the popularity of liposuction, the demand for nonsurgical fat reduction continues to steadily increase for those patients unwilling to undergo a surgical procedure.
- Cryolipolysis, chemical lipolysis, and thermal modalities, such as ultrasound and radiofrequency, have demonstrated the ability to effectively reduce excess subcutaneous adipose tissue, while minimizing risks, discomfort, and downtime.
- Nonsurgical fat-reduction modalities vary greatly because some require a single treatment, whereas others require multiple treatments and maintenance sessions.
- Future studies using standardized outcome measures should be considered to accurately compare current nonsurgical fat-reduction modalities.



Video content accompanies this article at www.advancesincosmeticsurgery.com.

INTRODUCTION: NATURE OF THE PROBLEM

Americans spent more than 15 billion dollars in 2016 on surgical and nonsurgical procedures [1]. The American Society for Aesthetic Plastic Surgery 2016 Cosmetic Surgery National Data Bank Statistics reported that liposuction remained the most popular surgical procedure with 414,335 procedures performed in 2016, a 4.6% increase from 2015 [1]. Liposuction is still considered the gold standard for treatment of excess subcutaneous fat; however, because of its invasive nature it retains risks, discomfort, and downtime [2–5]. Despite the popularity of liposuction, the demand for nonsurgical fat reduction continues to steadily increase for those

patients unwilling to undergo a surgical procedure. The American Society for Aesthetic Plastic Surgery 2016 Cosmetic Surgery National Data Bank Statistics also reported that there were 169,695 nonsurgical fat-reduction procedures performed in 2016, a 5.6% increase from 2015 [1]. Cryolipolysis, chemical lipolysis, and thermal modalities, such as ultrasound and radiofrequency, have demonstrated the ability to effectively reduce excess subcutaneous adipose tissue (Table 1), while minimizing risks, discomfort, and downtime [2,3,6–8]. For those patients desiring to reduce excess subcutaneous fat without the risks, discomfort, and downtime of a surgical procedure, nonsurgical fat-reduction modalities have shown to be an effective

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TABLE 1
Nonsurgical Fat-Reduction Modalities and Mechanisms of Action

Cryolipolysis	Cold-induced adipocyte apoptosis [2,5,9–12]
Chemical lipolysis (deoxycholic acid)	Lipolysis through destruction of adipocyte cell membrane [2,7,13,14]
Radiofrequency	Apoptosis through repeated adipocyte damage [2,15]
High-intensity focused ultrasound	Coagulative necrosis of adipocytes [2,16–19]

therapeutic option. Cosmetic practices that familiarize themselves with advances in nonsurgical fat-reduction modalities can offer the cosmetic patient various options for treating excess subcutaneous fat [8].

CRYOLIPOLYSIS (CoolSculpting)

Cryolipolysis was introduced as a novel nonsurgical fat-reduction technique by Manstein and colleagues [2,6] in 2007 and is one of the most recent procedures for nonsurgical fat reduction to become popularized. CoolSculpting (ZELTIQ Aesthetics, Pleasanton, CA, USA) is the only Food and Drug Administration (FDA)-approved cryolipolysis device. Currently more than 4 million CoolSculpting treatments have been performed worldwide [20]. Cryolipolysis has the ability to selectively destruct adipose tissue through controlled cooling [21]. The initial development of cryolipolysis was based on the observations of cold-induced fat reduction in the cheeks of children termed “popsicle panniculitis” [2,5,6]. The approach to cryolipolysis uses the observation that lipid-rich cells have a higher susceptibility to cold injury in comparison with water-rich cells, which allows adipocytes to be selectively targeted while sparing the surrounding tissue, such as vessels, nerves, muscles, and skin, [2,6,21]. Cryolipolysis is performed by applying a cup-shaped applicator with two cooling panels and initiating vacuum suction to draw target tissue between the cooling panels [2,11]. A cryolipolysis treatment session typically takes 60 minutes and decreases the temperature of target tissue drawn into the applicator to approximately 0°C [2,21]. Within the adipocytes, triglycerides crystallize and initiate the inflammatory process of adipocyte apoptosis, panniculitis, and subsequent elimination of adipocytes by macrophage phagocytosis, which is

clinically observed as a reduction of fat in the treated area [21]. The process begins 2 to 14 days following cryolipolysis treatment and persists for at least 4 months [9]. Cryolipolysis received FDA clearance in 2010 for flanks, 2012 for abdomen, 2014 for thighs, and 2015 for submental region [5]. Safety and efficacy of cryolipolysis for nonsurgical fat reduction has been established through numerous clinical studies.

Preprocedure Planning

Proper patient selection is necessary in patients seeking treatment with CoolSculpting. During visual assessment identify how fat naturally presents on the patient’s body and note any asymmetries [22]. During physical assessment perform a skin pinch test to determine if the tissue is pliable and if there is sufficient fat to be pulled into the applicator cup [22]. Excessive skin laxity, scar tissue presence, former aesthetic procedures in treatment area, and any asymmetries need to be considered and discussed with the patient before treatment to prevent an undesirable aesthetic outcome following CoolSculpting treatment. Obtaining baseline weight, circumferential measurements, and photographs are also an important consideration in preprocedure planning. Patients should understand that weight gain can contribute to an increase in subcutaneous fat in the treatment area and elsewhere. The amount of areas to be treated and the number of treatment sessions required varies among patients, which directly affects cost and should be discussed before treatment. Results are typically seen about 2 months following treatment and continue to improve for up to 4 to 6 months [23].

Patients should be prepared to anticipate common adverse effects following treatment. The most common adverse effects following treatment with CoolSculpting include erythema, edema/swelling, hematoma/bruising, blanching, pain, induration, pruritis, skin sensitivity, and paresthesia, which in most cases resolve within a few weeks after treatment [6,23]. It is also important to discuss the limitations of CoolSculpting because it is limited to the treatment of unwanted fat in target areas and is not a weight-loss solution for obese patients [23]. Setting realistic expectations in regards to cost, number of treatments, outcomes, and limitations is essential to patient satisfaction.

Preparation and Patient Positioning

The appropriate applicator for the treatment area is selected based on the need for debulking or sculpting (Table 2). The CoolMax applicator is ideal for large-volume reduction to debulk [22]. The CoolCore,

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