

## 20 Maximizing Safety with Cryolipolysis

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### Abstract

Cryolipolysis is among the most popular noninvasive treatments for focal adipose excess. The FDA cleared cryolipolysis for reduction of fat deposits in the flanks, abdomen, and thighs between 2010 and 2014; this technology has since emerged as a leader among noninvasive body contouring devices. Cryolipolysis works by preferentially destroying fat cells through a controlled thermal reduction. Exposure to below normal, but above-freezing temperature induces apoptosis of fat cells and takes advantage of adipocyte sensitivity to the cooling process when compared to surrounding tissues.

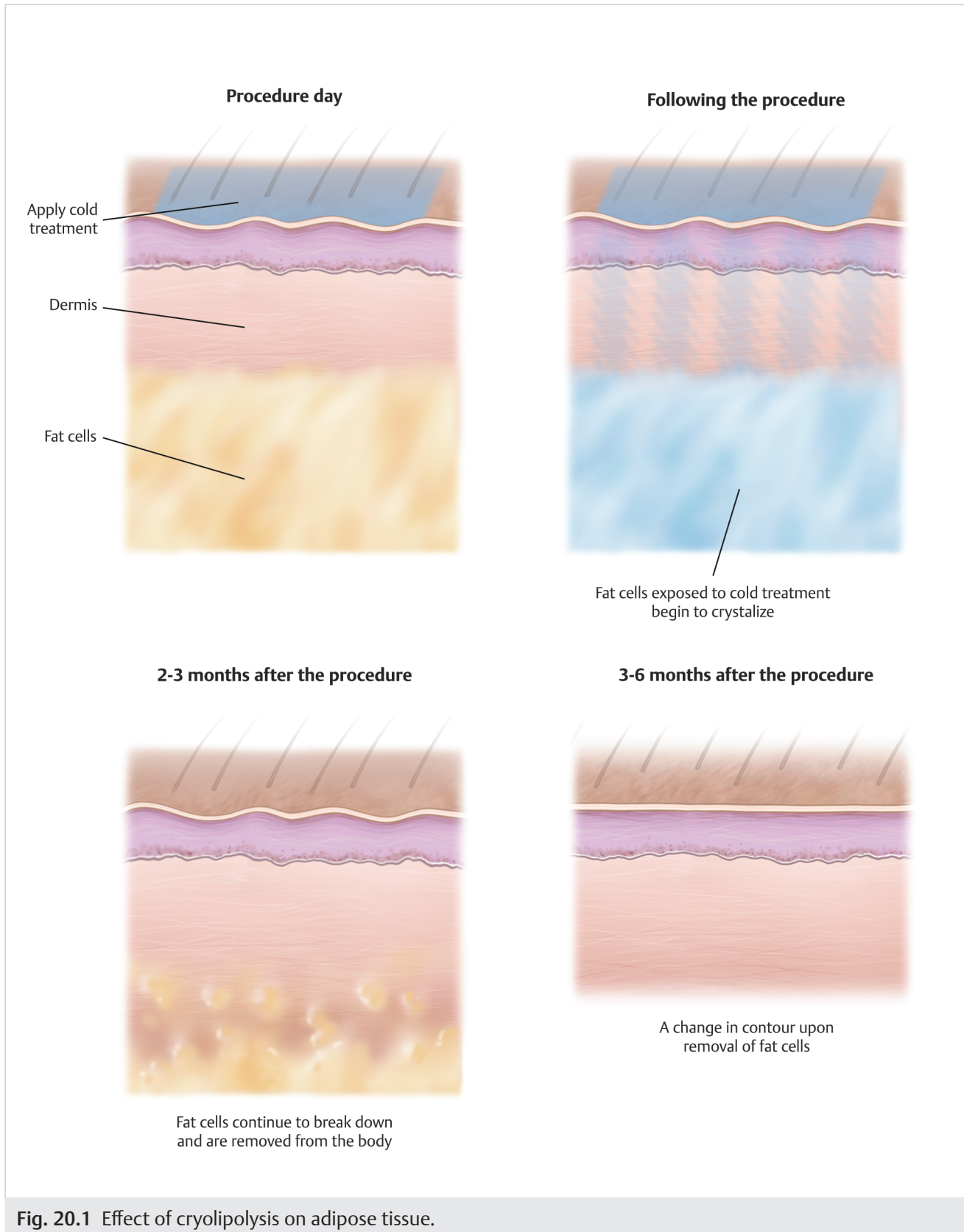
**Keywords:** cryolipolysis, noninvasive body contouring, adipocyte apoptosis, lipodystrophy

### Key Points

- Cryolipolysis is based on the concept that lipid-rich tissues are more susceptible to cold injury than surrounding water-rich tissue (► **Fig. 20.1**).<sup>1,2,3,4</sup>
- The method involves controlled application of cooling within the temperature range of -11 to 5°C.<sup>1,5,6</sup>
- Cryolipolysis targets adipocytes while sparing skin, nerves, vessels, and muscles.<sup>7</sup>
- This technology appears to be safe in the short and long term. It has not been shown to have any effect on cholesterol, triglycerides, low-density lipoprotein, high-density lipoprotein, liver function (aspartate aminotransferase (AST)/alanine aminotransferase (ALT) bilirubin), albumin, or glucose.<sup>7</sup>
- The mechanism for cryolipolysis is not fully understood. Theories include adipocyte apoptosis by cellular edema, reduced Na-K-ATPase activity, elevated lactic acid levels, and mitochondrial free radical release. Ultimately, an inflammatory process leads to adipocyte death and removal by macrophages within 3 months.<sup>8</sup>
- Complications are rare and typically resolve a few weeks after treatment. Adverse events include erythema, bruising, swelling, sensitivity, and pain. No persistent ulcerations, scarring, paresthesias, hematomas, blistering, bleeding, hyperpigmentation/hypopigmentation, or infections have been described.<sup>8,9,10</sup>
- Few isolated case reports have described paradoxical adipose hyperplasia after cryolipolysis treatment (est 1:20,000).<sup>11,12,13,14,15</sup>

### 20.1 Safety Considerations

- Ideal candidates are patients who require small focal areas of adipose tissue removal. Patients with excess adipose tissue or skin must be appropriately counselled, as they are likely better candidates for liposuction or excisional operations.
- Contraindications to cryolipolysis include cold-induced conditions such as cryoglobulinemia, cold urticarial, and paroxysmal cold hemoglobinuria.<sup>8,16</sup>
- Cryolipolysis should not be performed in treatment areas with severe varicose veins, dermatitis, or other cutaneous lesions.<sup>8,16</sup>



## 20.2 Clinical Correlations

- Cryolipolysis has been shown to safely and effectively reduce subcutaneous fat and has FDA clearance for treatment of the flanks, abdomen, thighs, submental area, back, bra area, underneath the buttocks, and the arm.
- Treatment protocols have yet to be optimized to maximize results. Patients should be notified that multiple treatments are often required for the desired effect.
- Subsequent treatments lead to further fat reduction; however, the extent of improvement has not been shown to be as dramatic as the first treatment. There are also variations to the degree of improvement with additional treatments based on the anatomic site (i.e., subsequent treatments of the abdomen have more marked results when compared to the flanks).<sup>7,8</sup>
- Massage/kneading of the soft tissues posttreatment has been shown to improve the efficacy of cryolipolysis clinically and histologically.<sup>8,17</sup>

## References

- [1] Kilmer SL, Burns AJ, Zelickson BD. Safety and efficacy of cryolipolysis for non-invasive reduction of submental fat. *Lasers Surg Med*. 2016; 48(1):3–13
- [2] Leal Silva H, Carmona Hernandez E, Grijalva Vazquez M, Leal Delgado S, Perez Blanco A. Noninvasive submental fat reduction using colder cryolipolysis. *J Cosmet Dermatol*. 2017; 16(4):460–465
- [3] Lee SJ, Jang HW, Kim H, Suh DH, Ryu HJ. Non-invasive cryolipolysis to reduce subcutaneous fat in the arms. *J Cosmet Laser Ther*. 2016; 18(3):126–129
- [4] Meyer PF, da Silva RM, Oliveira G, et al. Effects of Cryolipolysis on Abdominal Adiposity. *Case Rep Dermatol Med*. 2016; 2016:6052194
- [5] Li MK, Mazur C, DaSilva D, Canfield D, McDaniel DH. Use of 3-Dimensional Imaging in Submental Fat Reduction After Cryolipolysis. *Dermatol Surg*. 2018; 44(6):889–892
- [6] Wanitphakdeedecha R, Sathaworawong A, Manuskiatti W. The efficacy of cryolipolysis treatment on arms and inner thighs. *Lasers Med Sci*. 2015; 30(8):2165–2169
- [7] Bernstein EF. Long-term efficacy follow-up on two cryolipolysis case studies: 6 and 9 years post-treatment. *J Cosmet Dermatol*. 2016; 15(4):561–564
- [8] Ingargiola MJ, Motakef S, Chung MT, Vasconez HC, Sasaki GH. Cryolipolysis for fat reduction and body contouring: safety and efficacy of current treatment paradigms. *Plast Reconstr Surg*. 2015; 135(6):1581–1590
- [9] Jeong SY, Kwon TR, Seok J, Park KY, Kim BJ. Non-invasive tumescent cryolipolysis using a new 4D handpiece: a comparative study with a porcine model. *Skin Res Technol*. 2017; 23(1):79–87
- [10] Jones IT, Vanaman Wilson MJ, Guiha I, Wu DC, Goldman MP. A split-body study evaluating the efficacy of a conformable surface cryolipolysis applicator for the treatment of male pseudogynecomastia. *Lasers Surg Med*. 2018
- [11] Ho D, Jagdeo J. A Systematic Review of Paradoxical Adipose Hyperplasia (PAH) Post-Cryolipolysis. *J Drugs Dermatol*. 2017; 16(1):62–67
- [12] Karcher C, Katz B, Sadick N. Paradoxical Hyperplasia Post Cryolipolysis and Management. *Dermatol Surg*. 2017; 43(3):467–470
- [13] Keaney TC, Naga LI. Men at risk for paradoxical adipose hyperplasia after cryolipolysis. *J Cosmet Dermatol*. 2016; 15(4):575–577
- [14] Kelly E, Rodriguez-Feliz J, Kelly ME. Paradoxical Adipose Hyperplasia after Cryolipolysis: A Report on Incidence and Common Factors Identified in 510 Patients. *Plast Reconstr Surg*. 2016; 137(3):639e–640e
- [15] Kelly ME, Rodríguez-Feliz J, Torres C, Kelly E. Treatment of Paradoxical Adipose Hyperplasia following Cryolipolysis: A Single-Center Experience. *Plast Reconstr Surg*. 2018; 142(1):17e–22e
- [16] Sasaki GH. Reply: Cryolipolysis for Fat Reduction and Body Contouring: Safety and Efficacy of Current Treatment Paradigms. *Plast Reconstr Surg*. 2016; 137(3):640e–641e
- [17] Carruthers JD, Humphrey S, Rivers JK. Cryolipolysis for Reduction of Arm Fat: Safety and Efficacy of a Prototype CoolCup Applicator With Flat Contour. *Dermatol Surg*. 2017; 43(7):940–949