

# Fat Grafting for Facial Filling and Regeneration



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## KEYWORDS

- Fat grafting • Structural fat grafting • Coleman technique • Facial augmentation • Autologous fat
- Fat • Lipoaspirate • Adipose-derived stem cells

## KEY POINTS

- Fat grafting is a well-established technique to restore volume and enhance the quality of skin in the aging face.
- Harvesting by hand using 10-mL syringes is recommended to avoid traumatizing fat.
- Sterile centrifugation at 1286g for 2 minutes should be used for processing.
- Blunt tip cannulas should be used to diffusely transplant fat and avoid intravascular injection.
- Fat should be infused in small aliquots no greater than 0.1 mL per pass to encourage proximity to a blood supply and avoid fat resorption, necrosis, or oil cyst formation.
- Varying the depth of fat injection brings about desired cosmetic results.
- Maximal graft retention results from adherence to precise technique.
- Improvements in the quality of the overlying skin can be quite dramatic.

## INTRODUCTION

The key to fat grafting in the face is to appreciate and use the ability of fat to transform and rejuvenate the tissues into which it is placed. The first attempts of fat grafting to the face were performed to not only restore fullness but also improve the quality of the tissue into which the fat was grafted, including scars. In 1893, Gustav Neuber<sup>1</sup> described the use of transplanted fat not only for filling but also the reconstruction of an ugly depressed facial scar. Even in this earliest description of fat grafting, the surgeon recognized the importance of the transformation of the tissues into which the fat was placed. In this first reported case, the grafted fat was noted to improve the scarring.

Holländer<sup>2</sup> was the first to describe a technique for the injection of fat using a cannula in 1909. After

3 years, in 1912, he published more extensive descriptions of the injection technique and photographs of his results, in which he not only restored fullness to facial atrophy but also described the correction of adherent scars and adhesions and improvement in the tissues into which the grafted fat was injected.<sup>3</sup>

With the arrival of liposuction in the early 1980s, plastic surgeons had a new source for soft tissue filler, the lipoaspirate from liposuction.

Unfortunately, the surgeons in the 1980s who first used fat grafting implanted the grafts into the face with a bolus technique, which had less-than-desirable reported results.<sup>4,5</sup> In these reports, the surgeons described resorption of the fat without any other changes.

In the early 1990s, Coleman<sup>6-8</sup> introduced the technique of processing the fat by centrifuging

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and separating out the unwanted components (oil, blood, local anesthetic, and other noncellular material) and placing the fat in tiny aliquots with each pass of the cannula. Placement of the fat in small aliquots ensured the proximity of the injected fat to a blood supply and anchored the fat into the recipient tissue. This technique has been given many names, such as structural fat grafting, Lipo-Structure®, or the Coleman technique.

With more reliable techniques and instrumentation, fat grafting and harvesting and injecting with cannulas gradually become more popular. As a result, attention has returned to approaching facial rejuvenation not only by cutting and lifting but also through the restoration of fullness.

During this resurgence of fat grafting for the correction of atrophy associated with aging, an exciting observation has been made by the

surgeons placing fat under sun-damaged, aging, and scarred skin. There has been a transformation of the skin over time. The change observed is an improvement in the texture of the overlying skin, which includes one or all of the following: a decrease in wrinkling, a decrease in the size of pores, an improvement in skin color, an apparent thickening of the skin, an improvement in facial scarring, and a smoother, younger appearance.

In this article, the details of the Coleman technique, including harvesting, refinement, and placement methods are described to aid practitioners in obtaining long-term, consistent, and esthetically pleasing results for facial rejuvenation.<sup>6,7</sup> Patient selection and indications for facial fat grafting, potential complications, postoperative care, and current and future research and trends will be discussed (**Table 1**).

**Table 1**  
**Current research on fat grafting**

<b>Title</b>	<b>Author</b>	<b>Journal</b>	<b>Summary</b>
"Grading Lipoaspirate: Is There an Optimal Density for Fat Grafting?"	Allen et al, <sup>9</sup> 2013	<i>Plastic and Reconstructive Surgery</i>	More of the highest-density fractions of lipoaspirate were preserved over time compared with lower-density fractions. High-density fractions contained more progenitor cells and larger concentrations of several vasculogenic mediators compared with the lower-density fractions
"Endogenous Stem Cell Therapy Enhances Fat Graft Survival"	Butala et al, <sup>10</sup> 2012	<i>Plastic and Reconstructive Surgery</i>	Endogenous progenitor cell mobilization enhanced low-density fat neovascularization, increased vasculogenic cytokine expression, and improved graft survival to a level equal to that of high-density fat grafts
"Double-Blind Clinical Trial to Compare Autologous Fat Grafts Versus Autologous Fat Grafts with PDGF: No Effect of PDGF"	Fontdevila et al, <sup>11</sup> 2014	<i>Plastic and Reconstructive Surgery</i>	The addition of plasma-rich growth factors to the adipose tissue graft did not improve outcomes
"Prevalence of Endogenous CD34 <sup>+</sup> Adipose Stem Cells Predicts Human Fat Graft Retention in a Xenograft Model"	Philips et al, <sup>12</sup> 2012	<i>Plastic and Reconstructive Surgery</i>	Concentration of CD34 <sup>+</sup> progenitor cells within the stromal vascular fraction may be used to predict human fat graft retention
"Application of Platelet-Rich Plasma and Platelet-Rich Fibrin in Fat Grafting: Basic Science and Literature Review"	Liao et al	<i>Tissue Engineering Part B Reviews</i>	This article provides a general foundation on which to critically evaluate earlier studies, discuss the limitations of previous research, and direct plans for future experiments to improve the optimal effects of platelet-rich plasma in fat grafting

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