
A Personal Perspective

During the past five years, since the publication of my first book, *Structural Fat Grafting*, there has been a growing awareness worldwide of the critical role that fat transplantation can play in aesthetic and reconstructive surgery. Increasingly, European and American surgeons have embraced fat grafting as a primary plastic surgery procedure.

Although grafted fat was initially advocated for its ability to alter facial and body proportions and to fill defects, it is now recognized for its enormous regenerative potential. This appreciation of the added benefits conferred by fat grafting corresponds with my personal observations extending back to the early 1990s, when I noted that transplanted fat appeared to improve the quality of the tissues into which it was grafted. For example, fat placed into damaged muscle fibers precipitated not only an increase in volume, but also a recovery of muscle strength. I also observed that there was often a gradual, long-term improvement in the quality of the skin. Wrinkles softened, pore size decreased, and pigmentation improved for up to 10 years after fat grafting. About 1995, I noted that fat grafted under depressed scars not only relieved the depression, but also softened or even completely eliminated the specific scar tissue, making it look like normal skin. This led me to begin routinely treating depressed scars, acne scars, even old chemical burns by grafting fat.

In the mid-90s, Guy Magalon, director of the largest department of plastic surgery in France, visited me in New York. That visit prompted Dr. Magalon and me to organize a fat grafting symposium in Marseille in 1998. This symposium introduced my technique for structural fat grafting to a European audience. Since that meeting, French surgeons in particular have been enthusiastic advocates of the Coleman fat grafting technique and its potential. Dr. Magalon and plastic surgery departments throughout France have explored applications of fat grafting and contributed enormously to its current popularity. In 2006 the French Society of Plastic Surgery presented 18 scientific papers on fat grafting in their general session. Of particular interest was the French experience in treating subacute trauma as well as chronic ulcers of the legs.

I have had the unique opportunity to follow the international experience with fat grafting over the last decade because of close communications with plastic surgeons and other physicians worldwide. In 2004 Italian plastic surgeons began reporting remarkable clinical results using my structural fat grafting technique for treating pathological processes. For example, Gino Rigotti described treating end-stage radiation dermatitis

and breast scarring with fat grafting, while Giovanna Cantarella, an otolaryngologist working with a plastic surgeon, Riccardo Mazzola in Milan, reported remarkable recovery of paralyzed or scarred vocal cords in dozens of cases after injection of fat directly into the cords. Excitement about fat grafting and a recognition of its potential applications have not gone unnoticed in the United States either. For instance, Dr. Henry Kawamoto, a craniofacial surgeon in Los Angeles, has reported on the healing of irradiated ulcerating skin after treatment with fat grafts.

In 2005 Riccardo Mazzola organized a course in Milan sponsored by the Fondazione G. Sanvenero Rosselli. He invited me to speak along with a select group of European surgeons, such as Guy Magalon, Gino Rigotti, Giovanna Cantarella, and others who were using my fat grafting technique with impressive results. Particular attention was directed to unusual applications, such as breast augmentation. Many Italian and French surgeons shared their unique experiences at that meeting. Of special interest were the reconstructive and functional uses for fat grafting that were highlighted during the meeting.

In 2006, when Dr. Mazzola became President of the European Association of Plastic Surgery (EURAPS), we organized a two-hour panel on the expanding opportunities presented by transplanted fat with special emphasis on its reconstructive and regenerative applications. Since that time we organized a second symposium in Milan in 2007. This meeting represented a collaborative effort between EURAPS and the Fondazione G. Sanvenero Rosselli in Milan. The information presented at that meeting forms the foundation for this new book that Dr. Mazzola and I have edited. My 20-year experience with grafting fat is full of anecdotal evidence of the regenerative effects of fat grafting. Those clinical experiences are now being repeated, expanded and studied by other physicians worldwide. This book provides a vehicle for spreading the word about these exciting developments.

Sydney R. Coleman

Preface

Fat Injection: From Filling to Regeneration represents a unique collaboration among the world's leading experts in fat transplantation and explores the next stage in the evolution of fat grafting technique. Our objective is to provide basic knowledge about the biology of fat and fat grafting and then to demonstrate the incredible range of aesthetic and reconstructive applications for this important tool. Special emphasis is placed on the remarkable regenerative effects of transplanted fat stem cells on the surrounding tissue.

We are joined in this effort by 53 contributors who are at the forefront in fat transplantation science and technique. They share their scientific findings on the regenerative potential for fat stem cells as well as their insights and technical pearls on fat grafting.

The book begins with a historical introduction that traces the evolution of fat grafting from the first reports by Neuber in 1893 and Holländer in 1910 to the present time. It is filled with rare photos and documents drawn from the Mazzola library. The volume is then divided into 4 parts with 30 chapters. Each chapter is introduced with a brief editorial commentary to highlight its relevance and import.

The first part focuses on basic principles and concepts and includes chapters on adipose tissue biology, the niche theory for fat graft survival, determination of fat viability, processed lipoaspirate, and cryopreservation. The second and largest part is devoted to chapters on basic techniques and clinical applications, starting with a review of the Coleman technique with important innovations and updates and then describing in step-by-step fashion clinical applications—both aesthetic and reconstructive—in different anatomic areas. Important chapters are included on fat grafting to improve skin quality, for facial rejuvenation and recontouring, for breast surgery, for buttock augmentation, and for lower extremity reconstruction. Part III describes special applications for HIV-related lipoatrophy, vocal fold augmentation, and Dupuytren's contracture, among others.

The final section examines the future role of adipose-derived stem cells on surgery and medicine. Although promising applications of embryonic stem cells have been on the horizon for more than a decade and the world has invested heavily in research, we have not yet developed any clear-cut clinical applications for embryonic stem cells. However, plastic surgeons have recently discovered cures for such pathologic conditions as radiation burns and vocal cord paralysis using autologous human fat grafts.

We now know that fatty tissue has the highest percentage of adult stem cells of any tissue in the body. A plausible explanation for these effects now exists: *the repair cells (stem cells) in transplanted fat may be restoring damaged tissue*. However, what actually happens when fatty tissue is transplanted into humans has yet to be confirmed. Studies are needed to delineate the role of adipose-derived stem cells and preadipocytes in the repair of damaged tissue both in normal physiologic conditions and after free transplantation of fat.

A growing body of clinical evidence supports the role of fat grafting in accelerating the healing process. Grafted fat has demonstrated the potential to improve the quality of scarred skin and to heal radiation damage and chronic ulcers. Just how grafted fat causes these changes remains unanswered. We know that fat can perform amazing feats in a glass tube and in some animal models; however, we have little insight into what happens to fat when it is grafted from one part of the human body to another part. This book is a first attempt to answer some of those questions. It is written for experienced surgeons as well as young surgeons new to the field. We hope that it will stimulate researchers and clinicians to fully explore the enormous regenerative potential that grafted fat holds for the future.

Sydney R. Coleman
Riccardo F. Mazzola

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