# LipoCodes Methodology: Objective Control of Infiltrated and Aspirated Volumes in Liposuction

## *Metodologia LipoCodes: Controle objetivo de volumes infiltrados e aspirados em lipoaspiração*

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## Abstract

**Background** Liposuction techniques, technologies, publications, and scientific events evolve continuously seeking better, more predictable outcomes with maximum potential safety. However, there are no references to objective volume controls for more precise and predictable liposuction outcomes. These objective parameters could improve outcomes and safety, leading to the development of a methodology to obtain objective safety information to support fluid replacement and control regional and total aspirated volumes, thus optimizing surgical time. The present study aimed to describe a method called LipoCodes to measure infiltrated and aspirated volumes, surgical time, and speed in liposuction and fat grafting procedures.

**Materials and Methods** The LipoCodes methodology relies on four main parameters: fat deposit and graft regions; liposuction depth levels; access portals (incisions); and infiltrated and aspirated volume control.

**Results** The LipoCodes methodology controls infiltrated, fat suction, and fat graft volumes for each previously defined region as well as liposuction speed.

**Discussion** The LipoCodes methodology systematizes liposuction regardless of the equipment and preferred technique of each plastic surgeon. The goal is to make liposuction more controlled, objective, didactic, educational, and predictable.

**Conclusion** The LipoCodes methodology uses simple equipment to measure each milliliter of infiltrated, aspirated, and grafted volumes from previously defined body regions. This information provides objective parameters, volume control in liposuction, and surgical time control.

**Keywords**
- allografts
- lipectomy
- methods
- statistics and numerical data
- surgery, plastic

## Resumo

**Introdução** As técnicas atuais, tecnologias e publicações de lipoaspiração continuam a evoluir, buscando resultados melhores e mais previsíveis com o máximo de segurança possível. Por outro lado, não há referências a controles de volume mais objetivos para obter resultados mais precisos e previsíveis na lipoaspiração, parâmetros objetivos que poderiam melhorar os resultados e a segurança. Dentro deste contexto, foi desenvolvida uma metodologia para obter informações objetivas de segurança, apoiar a

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reposição de fluidos e o controle de volumes aspirados por região e total, otimizando dessa forma o tempo cirúrgico. O objetivo deste trabalho é descrever uma metodologia denominada Lipocodes, criada para aferir o volume infiltrado e aspirado, o tempo e a velocidade cirúrgica, em procedimentos de lipoaspiração e/ou lipoenxertia.

**Materiais e Métodos** A metodologia LipoCodes é baseada em regiões de depósito de gordura e regiões de enxerto; níveis de profundidade da lipoaspiração; portais de acesso (incisões); controle de volumes infiltrados e aspirados.

**Resultados** A metodologia LipoCodes desenvolveu o controle de volumes infiltrados, de sucção de gordura, e de enxerto de gordura, para cada região previamente definida, bem como a velocidade de lipoaspiração.

**Discussão** A metodologia LipoCodes foi desenvolvida para sistematizar a lipoaspiração, independentemente do equipamento e da técnica preferida de cada cirurgião plástico. O objetivo é tornar a lipoaspiração mais controlada, objetiva, didática e educacional, com mais previsibilidade.

**Conclusão** A metodologia LipoCodes utiliza equipamentos simples para medir cada mililitro de volume infiltrado, aspirado e enxertado de regiões corporais previamente definidas. Essas informações auxiliam com parâmetros objetivos, controle de volumes em lipoaspiração, bem como controle do tempo cirúrgico.

**Palavras-chave**
- aloenxertos
- cirurgia plástica
- estatística e dados numéricos
- lipectomia
- métodos

## Introduction

Liposuction techniques, technologies, publications, and scientific events evolve continuously, seeking increasingly better and more predictable outcomes with maximum potential safety.

Searching for better outcomes, there are references[1–14] about abdominal and body definition techniques and new technologies with laser, ultrasound, and radiofrequency devices for higher contraction of the fibrous septa and dermis, in addition to fat grafting techniques as great allies for improving outcomes with new preparation techniques and better integration. On the other hand, there are no references to objective volume controls for more precise and predictable liposuction outcomes, which would reduce the need for retouching or refinements by combining aesthetic sensitivity and surgical experience with objective parameters to control infiltrated and aspirated volumes of each body region treated.

Regarding safety, scientific articles[15–20] highlighted several points to minimize major and minor complications, emphasizing the significance of selecting a specialist with adequate training in plastic surgery and liposuction. The authors emphasized preoperative measures, including a thorough clinical evaluation, healthy and non-inflammatory nutritional status, avoiding obese patients and combined surgeries, and, especially, limiting surgical times to up to 5 hours.

A review revealed many articles highlighting these safety points to avoid complications, the importance of the aspirated volume for prognosis, and the greater risk of longer surgeries. However, there were few references[21–24] regarding a more effective control of infiltrated and aspirated volumes to minimize potential major and minor complications.

The present study aimed to describe a methodology called Lipocodes to measure the infiltrated and aspirated volume, time, and surgical speed in liposuction and fat grafting procedures.

## Materials and Methods

The current descriptive theoretical study presents the LipoCodes methodology.

The author developed the LipoCodes methodology in 2010 due to the difficulty in knowing exactly what was being infiltrated and aspirated in each body region during liposuction. This information would allow greater control of volumes and more precise outcomes, minimizing reinterventions and increasing the safety level in liposuction.

The lack of a previously described or properly presented model for controlling volumes in liposuction inspired the development of a methodology for volume control in liposuction.

Initially, it consisted of notes on printed paper of the volumes aspirated in the main liposuction regions for greater control. It evolved to control the infiltrated, aspirated, and grafted volumes in liposuction, in addition to the start and end time of infiltration and aspiration.

More recently, in 2021, this information was transferred to a Microsoft Excel (Microsoft Corp, Redmond, WA, USA) spreadsheet using volume automatic calculation tools, prior definition of the liposuctioned and fat-grafted regions, definition of access portals for liposuction/fat grafting, and calculation of the time for infiltration and liposuction. The LipoCodes methodology has been registered at the Brazilian National Institute of Industrial Property (Instituto Nacional da Propriedade Industrial – INPI, in Portuguese) since 2021, under number 920441726.

The LipoCodes methodology consists of four main parameters:

1. FAT DEPOSITION REGIONS AND GRAFT REGIONS;
2. LIPOSUCTION DEPTH LEVELS;
3. ACCESS PORTALS (INCISIONS); AND
4. INFILTRATED AND ASPIRATED VOLUME CONTROL.

1. FAT DEPOSIT AND GRAFT REGIONS:

The methodology defines 11 main fat deposit regions and 8 fat graft regions. Their limits (anatomical references) are described below (►**Figs. 1**–**4**):

1A. FAT DEPOSITION REGIONS:

ARMS (►**Figs. 1**–**2**)

Surface of the deltoid muscles (posterior or spinal portion) and triceps.

CHEST (►**Fig. 3**)

Surface of the pectoralis major muscle (portions with a sternal origin, sixth and seventh ribs, rectus abdominis).

UPPER BACK (►**Figs. 1**–**4**)

Surface of the serratus anterior muscle (anterior limit), teres major and teres minor muscles (upper limit), and the upper third of the latissimus dorsi muscle (inferior and posterior limit).

LOWER BACK (►**Figs. 1**–**4**)

Surface of the lower third of the latissimus dorsi muscle (upper limit), thoracolumbar fascia (posterior limit), external oblique muscle (anterior limit), and Lockwood's ligament (inferior limit).

UPPER ABDOMEN (►**Figs. 1**–**3**)

The medial limit is the linea alba, from the umbilicus to the xiphoid process; the superior limit is the costal margin; the lateral limit is the anterior borders of the serratus and external oblique muscles; and the inferior limit is the horizontal line from the linea semilunaris to the umbilicus.

LOWER ABDOMEN (►**Figs. 1**–**3**)

The medial limit is the linea alba, from the umbilicus to the pubic symphysis; the superior limit is the horizontal line from the linea semilunaris to the umbilicus; the lateral limit

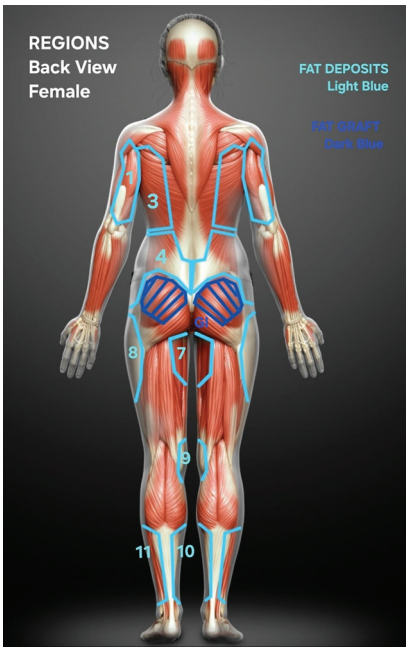


**Fig. 2** Female model, back view. Predefined fat deposition regions: upper back (3), lower Back (4), inner thighs (7), trochanteric region (8), knees (9), medial legs (10), and lateral legs (11). The figure also shows the predefined regions for fat grafting in the gluteus (Gl).

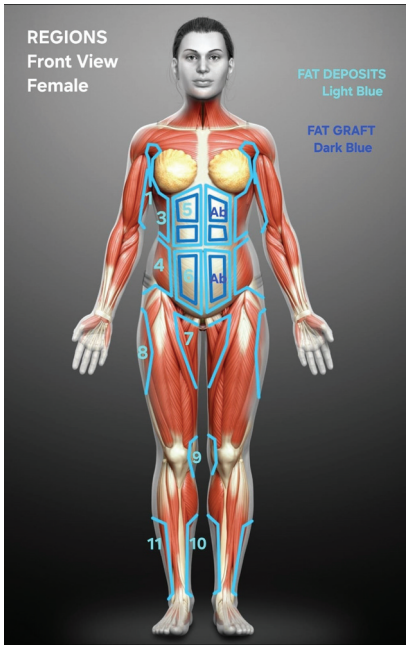


**Fig. 1** Female model, frontal view. Predefined fat deposition regions: arms (1), upper back (3), lower back (4), upper abdomen (5), lower abdomen (6), inner thighs (7), trochanteric region (8), knees (9), medial legs (10), and lateral legs (11). The figure also shows the predefined regions for fat grafting in the abdomen (Ab).

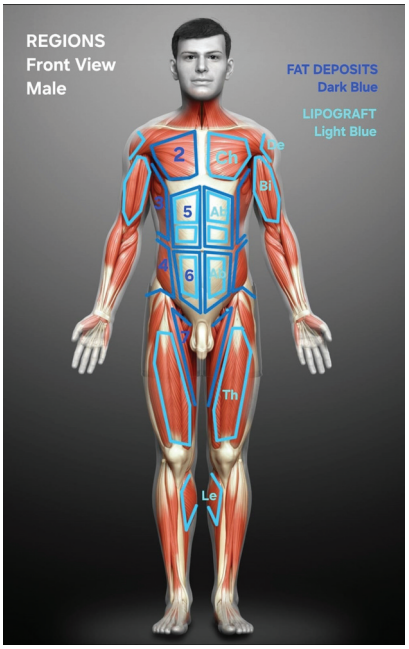


**Fig. 3** Male model, frontal view. Predefined fat deposition regions: pectoral (2), upper back (3), lower back (4), upper abdomen (5), lower abdomen (6), and inner thighs (7). The figure also shows the predefined regions for fat grafting in the abdomen (Ab), deltoids (De), biceps (Bi), chest (Ch), and thighs (Th).

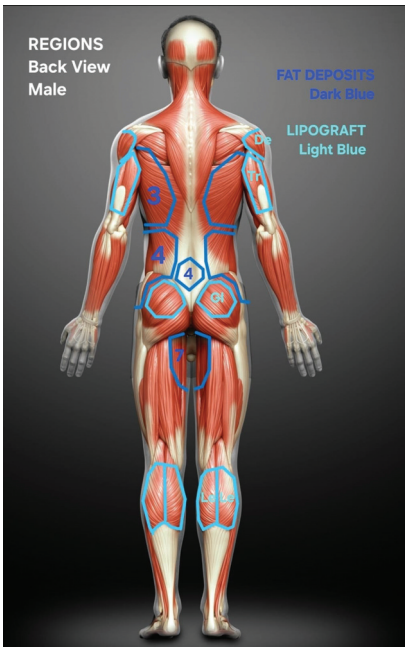


**Fig. 4** Male model, back view. Predefined fat deposition regions: upper back (3), lower back (4), and inner thighs (7). The figure also shows the predefined regions for fat grafting in the deltoids (De), triceps (Tr), and gluteus (Gl).

is the anterior border of the external oblique muscle; and the inferior limit goes from the inguinal ligament to the pubic symphysis.

INNER THIGHS (►**Figs. 1**–**4**

Triangle between the inguinal ligament (upper limit), sartorius muscle (lateral limit), posterior border of the adductor magnus muscle (posterior limit).

TROCHANTERAL REGION (►**Figs. 1**–**2**)

Tensor fasciae latae muscle (anterior limit), gluteus maximus muscle (posterior limit), vastus lateralis muscle (inferior limit), and Lockwood's ligament (upper limit).

KNEES (►**Figs. 1**–**2**)

Inner knees and pes anserinus region (tendons of the gracilis, sartorius, and semitendinosus muscles).

INNER LEGS (►**Figs. 1**–**2**)

Lower border of the medial gastrocnemius muscle belly (upper limit), calcaneal tendon (posterior limit), tibia (anterior limit), medial malleolus of the tibia (inferior limit).

LATERAL LEGS (►**Figs. 1**–**2**)

Lower border of the lateral gastrocnemius muscle belly (upper limit), calcaneal tendon (posterior limit), tibialis anterior muscle (anterior limit), lateral malleolus of the fibula (inferior limit).

1B. FAT GRAFTING REGIONS:

ABDOMEN (Ab) (►**Figs. 1**–**3**)

Surface of the rectus abdominis muscles.

DELTOID (De) (►**Figs. 3**–**4**)

Surface of the deltoid muscle (lateral portion).

TRICEPS (Tr) (►**Fig. 4**)

Surface of the triceps muscle (long and lateral portions).

BICEPS (Bi) (►**Fig. 3**)

Surface of the biceps muscle (long and short portions).

CHEST (Ch) (►**Fig. 3**)

Surface of the pectoralis major muscle.

GLUTEUS (Gl) (►**Figs. 2**–**4**)

Surface of the gluteus maximus muscle (upper 3/4).

THIGHS (Th) (►**Fig. 3**)

Surface of the vastus lateralis and vastus medialis muscles.

LEGS (Le) (►**Figs. 3**–**4**)

Surface of the lateral and medial bellies of the gastrocnemius muscle.

2. LIPOSUCTION DEPTH LEVELS (►**Fig. 5**):

- LEVEL I;
- LEVEL II; AND
- LEVEL III.

LEVEL I (►**Fig. 5**): Liposuction of fat from the deepest plane of the subcutaneous cellular tissue (SCCT) below the superficial fascia and above the muscular fascia.

LEVEL II (►**Fig. 6**): Liposuction of fat from the SCCT above the superficial fascia and below the dermis.

LEVEL III (►**Fig. 7**): Liposuction of fat from the SCCT above the superficial fascia and below the dermis. Its difference from level II is its proximity to the dermis (juxtadermal) and positioning of the cannula holes facing downwards. Level III aims to promote the formation of depressions and grooves to highlight planned anatomical elements (definition liposuction).

3. ACCESS PORTALS (INCISIONS) (►**Figs. 8**–**11**):

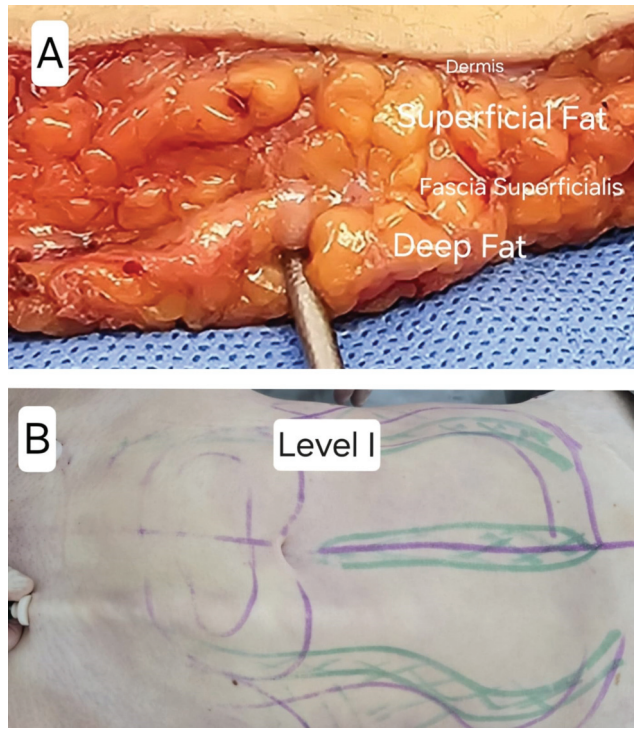


**Fig. 5** Liposuction depth levels. Level I. (**A**) Abdominal flap removed at abdominoplasty, with the liposuction cannula at level I, below the superficial fascia and above the muscular fascia. (**B**) Liposuction cannula under the superficial fascia and above the muscular fascia (Level I) in the abdominal region.

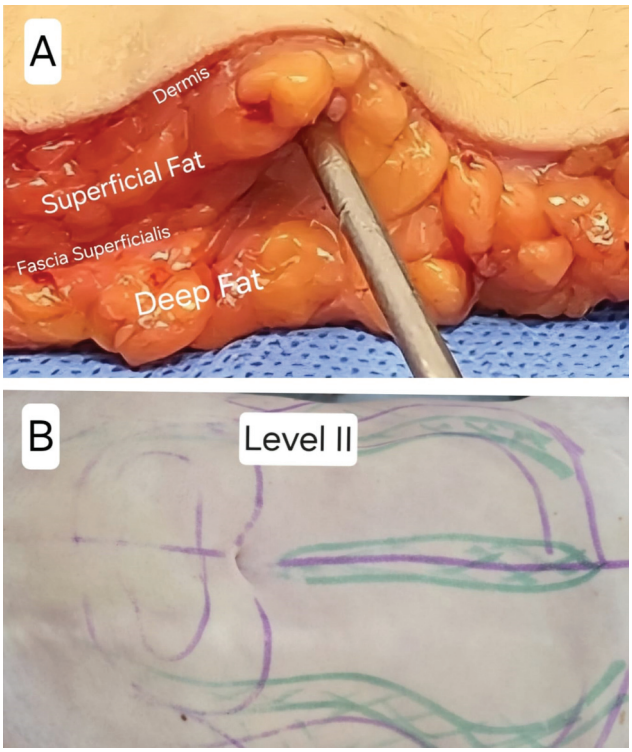


**Fig. 6** Liposuction depth levels. Level II. (**A**) Abdominal flap removed at abdominoplasty, with liposuction cannula at level II, above the superficial fascia and below the dermis. (**B**) Liposuction cannula below the dermis and above the superficial fascia (level II) in the abdominal region.

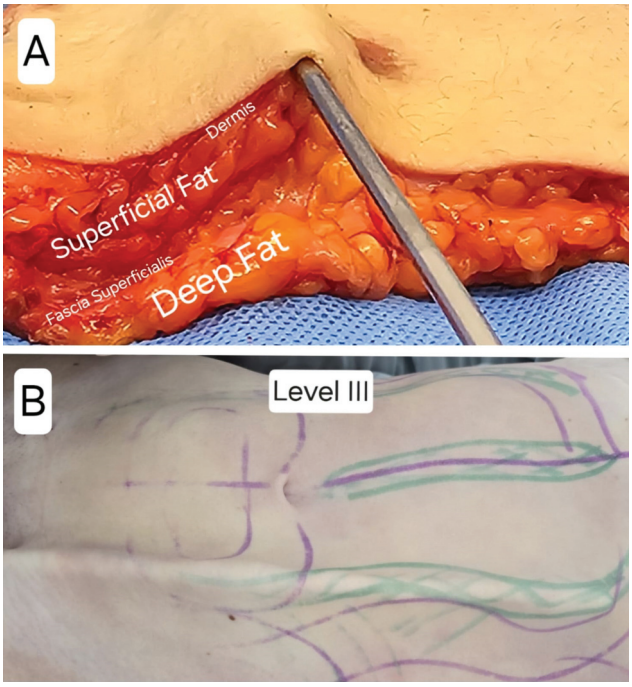


**Fig. 7** Liposuction depth levels. Level III. (**A**) Abdominal flap removed at abdominoplasty, with liposuction cannula at level III, just below the dermis, with the cannula holes facing downwards. (**B**) Juxtadermal liposuction cannula (level III) in the abdominal region.

These portals were designed for the two most commonly used decubitus positions in liposuction surgeries:

3A. VENTRAL DECUBITUS (VP) (►**Figs. 8**–**9**)

- E (elbow)
- P (pubis)
- K (knees)
- L (legs)
- T (thoracic back)
- S (sacrum)
- G (gluteal groove)
- U (umbilicus)

3B. SIDE DECUBITUS (SD) (►**Figs. 10**–**11**)

- E (elbow)
- M (mammary groove)
- I (iliac crest)
- P (pubis)
- K (knees)
- L (legs)
- U (umbilicus)

4. INFILTRATED AND ASPIRATED VOLUME CONTROL

### Infiltrated volume control

Infiltration of the prepared solution with a 50-mL graduated syringe to control each milliliter of infiltrated volume in each previously defined region. The infiltrated volume is recorded in a specific Excel spreadsheet, the LipoCodes spreadsheet, which has a model for female (►**Fig. 12**) and another for male patients (►**Fig. 13**). The two spreadsheets have an automatic sum feature to control the regional and total infiltrated volumes.

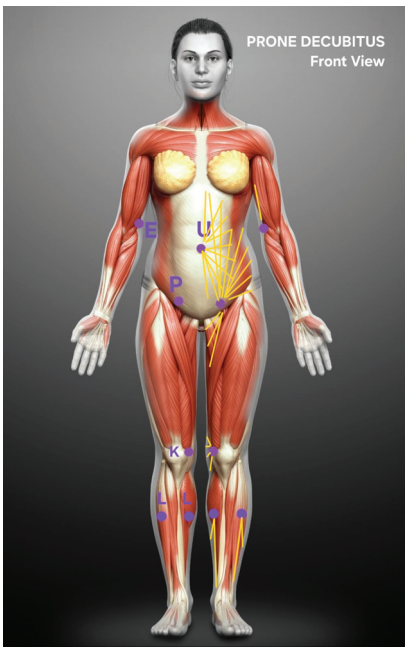


**Fig. 8** Female model, frontal view. Access portals and cannula extension (in yellow) for preferred liposuction in prone decubitus: E (elbow), U (umbilicus), P (pubis), K (knees), and L (legs).

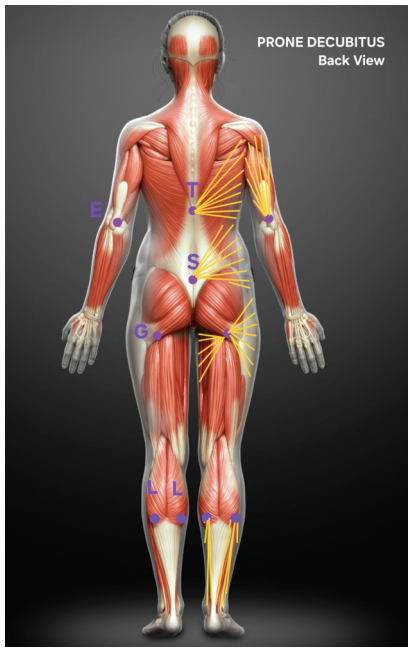


**Fig. 9** Female model, back view. Access portals and cannula extension (yellow) for preferred liposuction in prone decubitus: E (elbow), T (thoracic back), S (sacral), G (gluteal fold), and L (legs).

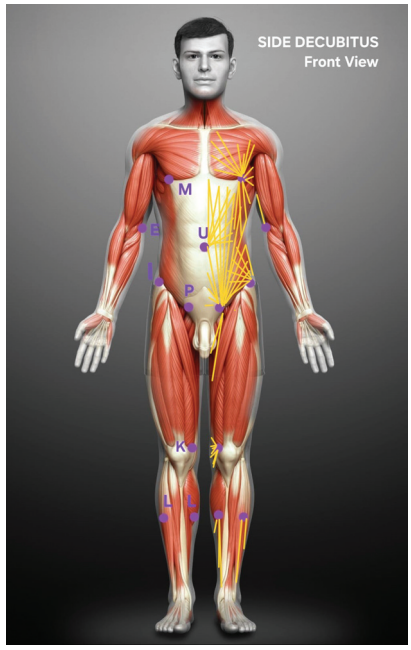


**Fig. 10** Male model, frontal view. Access portals and cannula extension (yellow) for preferred liposuction in side decubitus: E (elbow), M (mammary groove), U (umbilicus), I (iliac crest), P (pubis), K (knees), and L (legs).

Each column of the spreadsheet corresponds to the previously described regions. The columns for the most commonly treated regions in liposuction are defined, and the blank columns are for less common regions. The infiltration volume from sequential 50-mL syringes is recorded in the first line of each column, highlighted in gray.

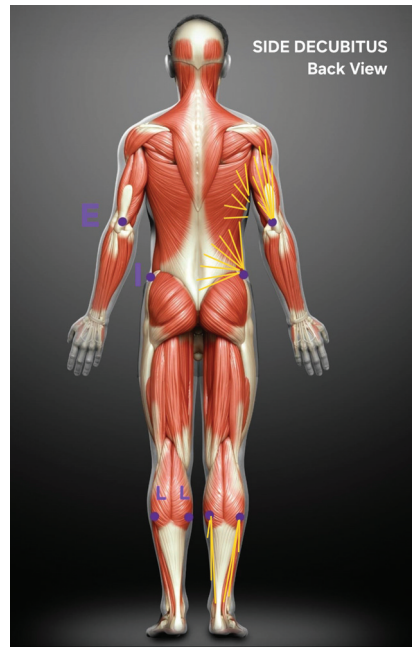


**Fig. 11** Male model, back view. Access portals and cannula extension (yellow) for preferred liposuction in side decubitus: E (elbow), I (iliac crest), and L (legs).

## Aspirated volume control

This control uses an intermediate system (►**Figs. 14**–**15**) developed by the author to count aspirated volumes positioned between the liposuction hoses, called the LipoCodes system.

The LipoCodes system consists of a 50-mL syringe with a catheter tip, graduated in milliliters, without the plunger (which is removed) (►**Fig. 14**).

The upper part of the 50-mL syringe, at the plunger inlet, has a stainless-steel piece developed by the author with 2 outlets for liposuction hose connection: one hose for liposuction and the other for exhaust (►**Fig. 15**).

In the lower part of the 50-mL syringe, the catheter tip is connected to an outlet connector from a urine collector, and its opening and closing valve controls the volume aspirated in the 50-mL syringe (►**Fig. 15**).

In this system, the liposuction fat enters the upper part and fills the 50-mL syringe. When the syringe is full (►**Fig. 14**), the volume in milliliters is recorded on the spreadsheet (►**Figs. 12**–**13**) in the column corresponding to each region, and the total aspirated volume is automatically recorded. Next, the valve at the bottom is opened to empty the syringe and then closed.

This sequence is repeated until the liposuction outcome and volume for each region are achieved.

## Grafted volume control

Fat grafting aspiration uses negative pressure and a 50-mL graduated syringe for exact control, per milliliter, of the grafted volumes in each previously defined region.

The grafted volumes by region are recorded in the space provided for fat grafting in the LipoCodes spreadsheet

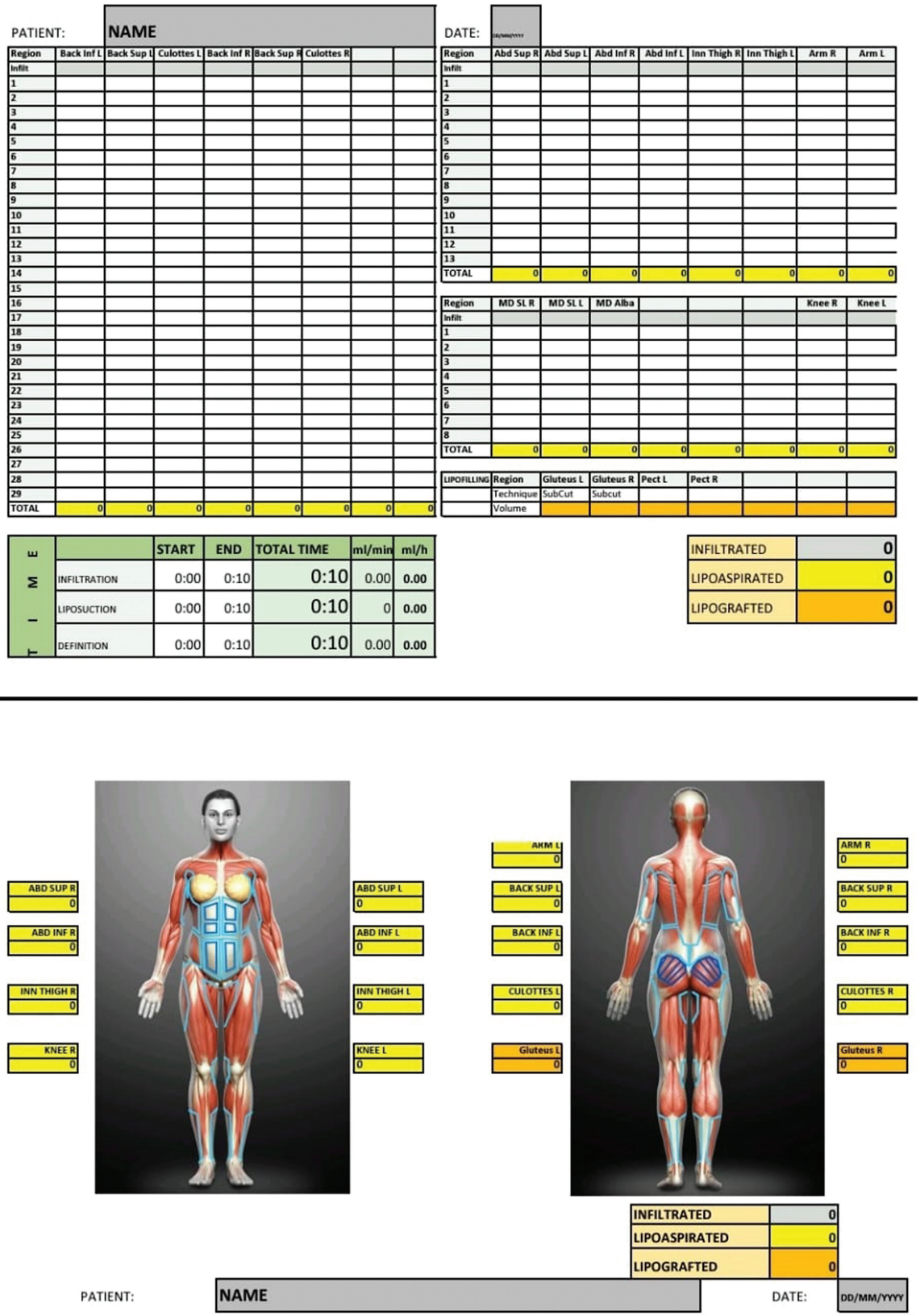


**Fig. 12** Spreadsheet for female patients. The first page has columns for each predefined aspiration and grafting region. The first line in each column, in gray, records the infiltrated volume in each region. Other lines (in white) record the aspirated and grafted volumes obtained with the intermediate device. The yellow line below each column is the total liposuction or grafting volume for each predefined region. Below and to the right, the total infiltrated, liposuctioned, and grafted volumes are calculated automatically. Below and to the left, the surgical times are recorded, including the start and end times of infiltration, aspiration, and definition liposuction. On the second page, developed to facilitate patient understanding, two female models, in front and back views, highlight the predefined aspiration and grafting regions and, next to them, the total volumes of each region at the corresponding levels. The total volumes (infiltration, aspiration, and grafting) are also at the bottom of this page.

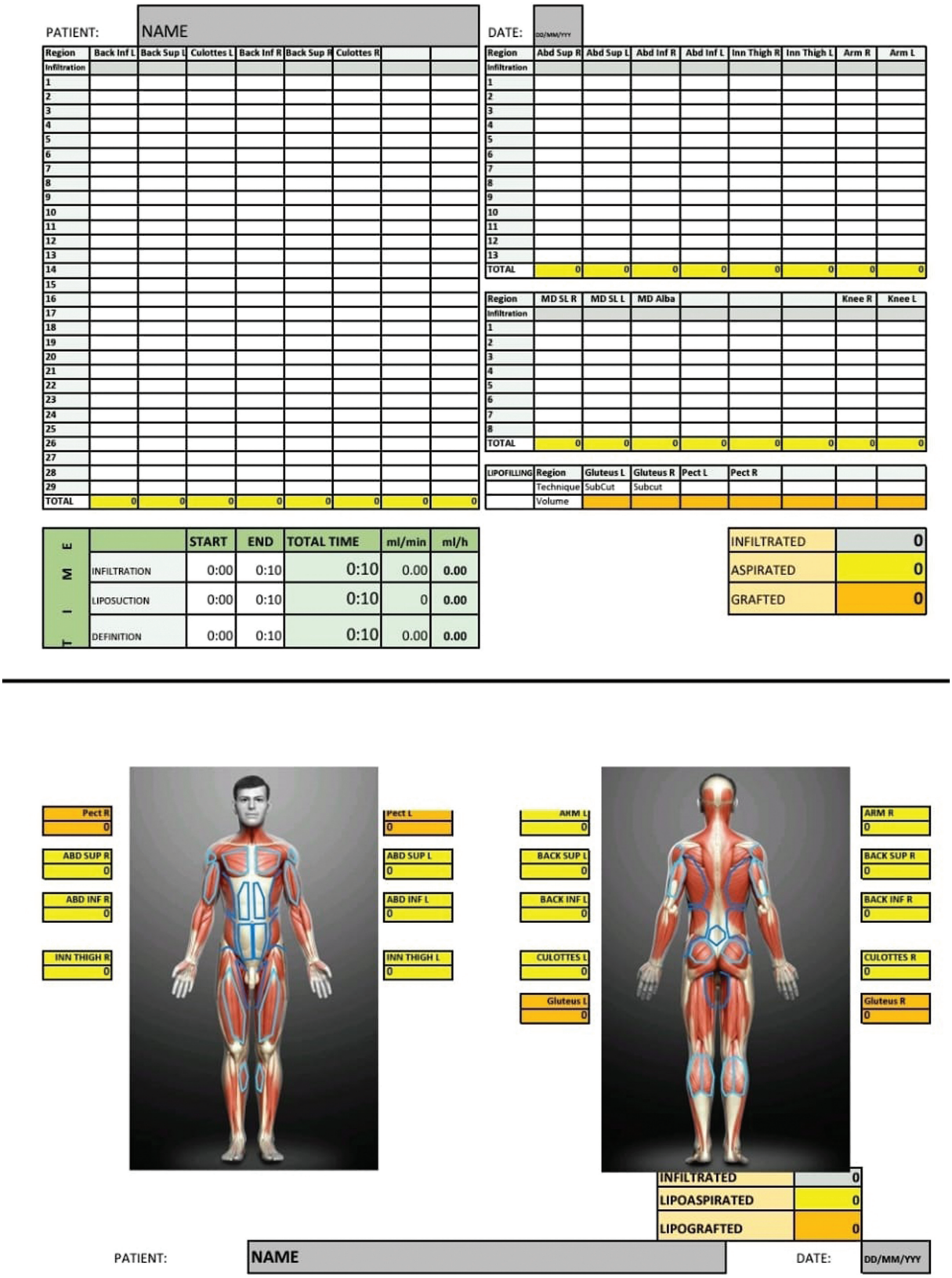


**Fig. 13** Spreadsheet for male patients. The first page has columns for each predefined aspiration and grafting region. The first line in each column, in gray, records the infiltrated volume in each region. Other lines (in white) record the aspirated and grafted volumes obtained with the intermediate device. The yellow line below each column is the total liposuction or grafting volume for each predefined region. Below and to the right, the total infiltrated, liposuctioned, and grafted volumes are calculated automatically. Below and to the left, the surgical times are recorded, including the start and end times of infiltration, aspiration, and definition liposuction. On the second page, developed to facilitate patient understanding, two female models, in front and back views, highlight the predefined aspiration and grafting regions and, next to them, the total volumes of each region at the corresponding levels. The total volumes (infiltration, aspiration, and grafting) are also at the bottom of this page.

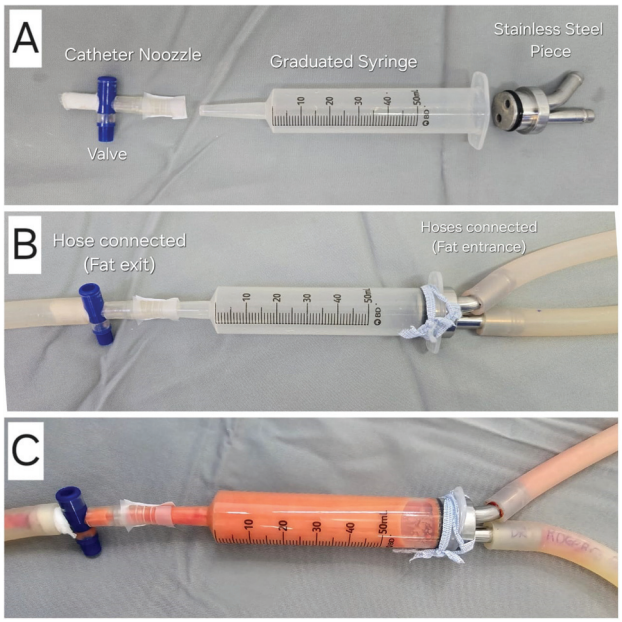


**Fig. 14** System for accurate counting of aspirated volumes, with three parts: (**A**) catheter tip obtained from a urine collector, with its opening and closing valve; 50mL syringe with catheter tip, graduated in milliliters, without the plunger (discarded); stainless-steel part with two outlets to connect liposuction hoses: one for liposuction and the other for exhaust. (**B**) Connected parts ready for use. (**C**) System in use, with fat in the syringe, before disposal.

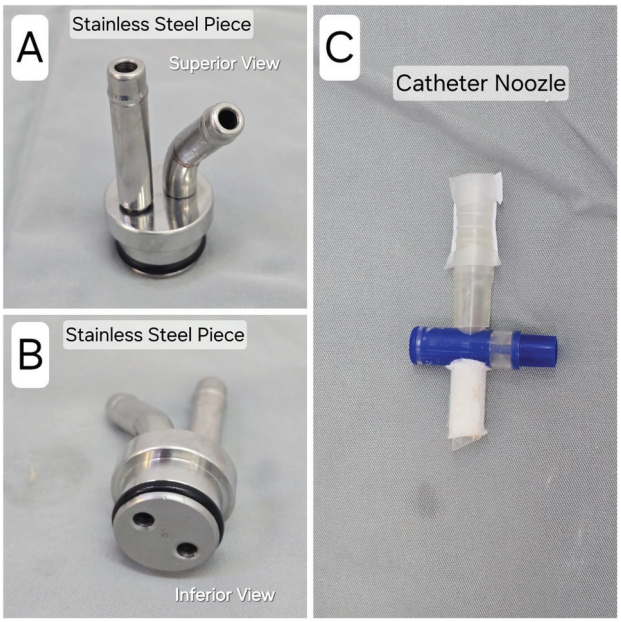


**Fig. 15** (**A**) Top view of the stainless-steel part with two outlets for connecting liposuction hoses. (**B**) Bottom view of the part. C. Catheter tip obtained from a urine collector and its opening and closing valve.

(►**Figs. 12**–**13**), allowing their visualization at any time during surgery or later.

### Surgical time control

The LipoCodes spreadsheet records the start and end times for infiltration, liposuction, and its definition (►**Figs. 10**–**11**).

The spreadsheet automatically calculates the liposuction speed in mL/min and mL/h (►**Figs. 12**–**13**).

## Results

The methodology allowed the control of infiltrated, aspirated, and fat-grafted volumes in milliliters for each previously defined region, the surgical speed in mL/min and mL/h, and the total surgical time.

## Discussion

New techniques, technologies, and scientific publications on liposuction continue to evolve significantly, increasingly seeking better and more predictable outcomes[1–14] with maximum potential safety.[15–20]

The Lipocodes methodology allows precise control of infiltrated and aspirated volumes per milliliter with specific and well-defined anatomical regions, coinciding with the usual locations of fat deposits, well known by plastic surgeons, with higher anatomical definitions for better understanding and education purposes.

The methodology defines three levels of suction depth, which, combined with the above-mentioned anatomical regions, provide a three-dimensional view of liposuction.

This objective information on the volume in milliliters from each region increases the expectation of the aesthetic outcome to control symmetry and treat any potential asymmetries, in addition to controlling the grafted fat volume when indicated. Currently, the endpoint in most liposuctions has been based on coarser volume information (deciliter or centiliter) and the subjective observation and personal experience of each plastic surgeon. In this methodology, the volume information is inserted into the Lipocodes spreadsheet, which is monitored by the surgeon and the medical team during the procedure, to achieve greater precision in liposuction by using objective parameters that help the surgeon forecast the volumes for infiltration and aspiration in each region, guiding the correction of any asymmetries. It also contributes to better team monitoring, making liposuction more educational, controlled, and objective for younger and more experienced surgeons.

In addition, objective information about infiltrated and aspirated volumes is significant for safety by aiding intra and postoperative fluid replacement.

The author developed the LipoCodes intermediate system (►**Figs. 14**–**15**) for counting aspirated volumes with a 50-mL syringe without a plunger and a stainless-steel part positioned between the liposuction hoses in an artisanal manner to control each milliliter. Current commercial systems count in 50-mL increments, which prevents more rigorous volume control. The author is negotiating to develop the intermediate system with specialized companies for large-scale production and commercialization.

Another significant piece of information provided by LipoCodes is the surgical speed in mL/min and mL/h. This information provides the plastic surgeon and the team with knowledge on the pace of the surgery, the liposuctioned fat removal time, and the procedural duration. The importance of surgical time to minimize complications is well cited in the literature.[11,14,17,18,20,25] Since there is growing concern regarding surgical time, the Lipocodes methodology encourages a better intraoperative flow and improves the understanding of the entire team through standardization, reducing anesthesia time, surgical time, materials, and stress.

The defined portals or incisions lie at the two most commonly used decubitus positions for posterior region liposuction. These are suggestions to minimize the number of portals, and the surgeon can modify them according to personal preference.

Regarding liposuction depth, level I is below the superficial fascia, allowing increased volumetric reduction and lower contour remodeling; this is why we begin liposuction in this deeper plane. Level II is above the superficial fascia for better contour remodeling, requiring more care to avoid irregularities. Level III is closer to the dermis, and it requires leaving the cannula holes facing downwards to avoid greater trauma to the deep dermis, which could cause exaggerated retractions, dyschromia, pain, and other complications. This liposuction for definition purposes was originally described by Mentz[26] and improved by Hoyos,[27] being widely used by several plastic surgeons and challenged by others.

By controlling the well-defined regions, the infiltrated and aspirated volumes, and the aspiration depth levels, the three-dimensional liposuction has a more precise control for better outcomes, asymmetry correction, and fewer touch-ups and refinements.

The LipoCodes methodology systematizes liposuction regardless of the equipment and technique preferred by each plastic surgeon. The goal is to make liposuction more controlled, objective, didactic, and educational, with higher predictability.

The LipoCodes methodology can use any liposuction equipment: syringe, aspirator, vibration system, ultrasound, and laser. The plastic surgeon does not need to change their preferred technique or equipment for infiltration and liposuction, only add the intermediate system and the LipoCodes spreadsheet to transfer the information obtained during the liposuction surgery with or without grafting.

Our review found six articles using volume and region control measurements. Araújo[28] measured the skin fold with an adipometer before and six months after the procedure, showing the outcomes with no numbers, only photos. Cohen et al.[10] compared three-dimensional magnetic resonance images and total fat aspirated for the entire abdomen, before and six months after surgery. Marongiu et al.[21] cited a method to control and accelerate infiltration. Bukret and Alonso[22] developed geometric models for liposuction marking to improve efficacy and safety in laser liposuction. Harutyunyan et al.[23] used ultrasound to calculate the fat volume for liposuction and developed specific software. Lastly, Gu et al.[24] developed a method for circumferential liposuction in several locations in the arm, quantifying clinical efficacy. We did not find references presenting a clear control of infiltrated and aspirated volumes, defining regions and aspiration planes, describing access portals, or controlling surgical speed.

In summary, the main objectives of the LipoCodes methodology are to:

1. Obtain objective parameters of liposuction volumes by areas, depth, and volumes to be aspirated.
2. Develop an intraoperative flow (sequence).
3. Improve the understanding of the entire team through standardization.
4. Reduce losses (anesthesia, materials, surgical time, stress).
5. Increase the surgical procedure flow.
6. Reduce surgical time.
7. Improve predictability.
8. Obtain more consistent outcomes.
9. Improve asymmetry treatment.
10. Minimize the potential for refinements or adjustments.
11. Assist in the artistic thinking of the plastic surgeon.
12. Use with any liposuction equipment preferred by each plastic surgeon.

## Conclusion

The author developed the LipoCodes methodology to be used with any liposuction equipment: syringe, aspirator, vibration system, ultrasound, and laser.

This information aims to assist the plastic surgeon with objective parameters, infiltrated, aspirated, and grafted volume control, and surgical time control so that the surgical team can obtain more predictable outcomes, improve asymmetry treatment, reduce the need for touch-ups and reinterventions, and increasing patients' safety.

### Author's Contributions

RSG: data analysis and/or interpretation; final manuscript approval; data collection; conceptualization; study conception and design; resource management; project management; methodology; performance of operations and/or experiments; writing – original draft preparation, writing – review & editing; software; supervision; validation; and visualization.

### Clinical Trials

None.

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### Conflict of Interests

The author has no conflict of interests to declare.

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