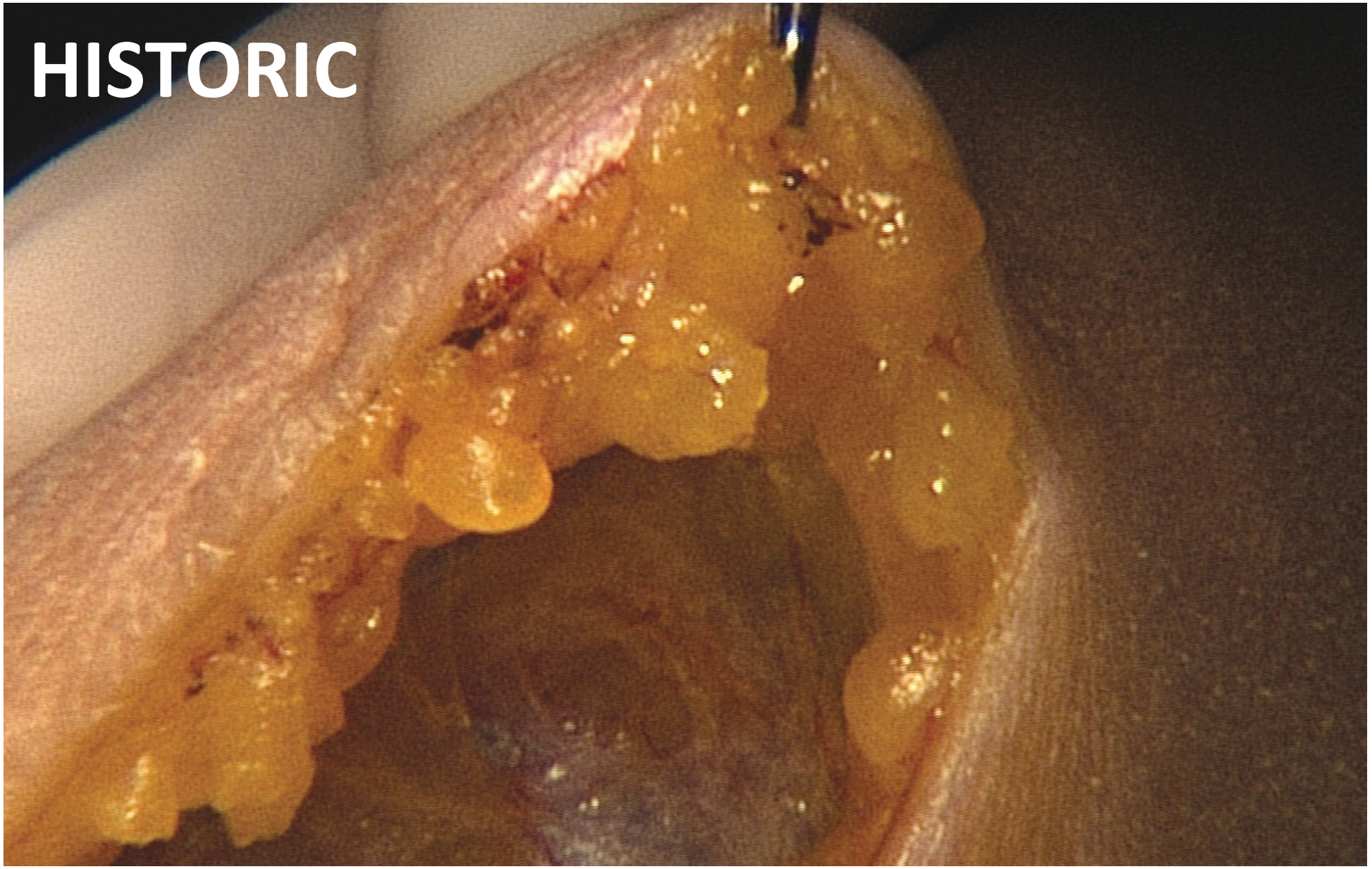
Réinjection de Tissu Graisseux & Dérivés: - Les étapes pour bien débuter.

Professeur Guy **MAGALON**

Marseille France

g.magalon@gmail.com


HISTORIC

FAT

1893

NEUBER G.A. 1850 – 1932 **GERMANY**

Fett transplantation, Verl.Dtsch.Ges.Chir. 1893, Long Vern 22:66

CZERNY V. 1842 – 1916 **GERMANY**

Czerny V. Drei plastische Operationen.3. Plastischer Ersatz der Brustdruse durch ein Lipom. Arch f Klin Chir 50:544-550, 1985

LEXER E. 1867 – 1937 **GERMANY**

Freie Fetttransplantation. Dtsch. Med.Wochenschr. 1910, 36:640

1984 - 1989

ILLOUZ Y.G. 1980 **FRANCE**

L 'avenir de la réutilisation de la graisse après liposucion.
Rev. Chir. Est. **1984**, 36 (9)

L 'avenir de la réutilisation de la graisse après liposucion.(suite)
Rev. Chir. Est. **1985**, 38 (10) : 19-22

Utilisation de la graisse aspirée pour combler les defects cutanés.
Rev. Chir. Est. **1985**, 40 : 13-20

The fat cell graft : A new technique to fill depressions
Plast.Reconstr.Surg. **1986**, 78 : 122-123

La sculpture chirurgicale par lipoplastie.
Perspective d 'avenir : la réinjection ou transposition autogène de la graisse aspirée. Paris, Arnette, **1988**

Present results of fat injection. Aesth.Plast.Surg. **1988**, 12 : 175-181

FOURNIER P. 1996 **FRANCE**

Liposculpture : Ma Technique (2ème édition) Paris, Arnette **1996**

1994

COLEMAN S.R. 1990 **USA**

* The technique of periorbital lipoinfiltration
  Op.Techn.Plast.Reconstr.Surg. 1994, vol 1, n°3

* Lipoinfiltration of the upper lip white roll.
  Aesth.Surg. 1994, vol 14, n°4

* Long-term survival of fat transplants :
  Controlled demonstrations.
  Aesth.Plast.Surg. 1995, vol 19 : 421-425

* Facial recontouring with lipostructure.
  Clinics in Plast. Surg. 1997, vol 24 :347-367

* Training Course , Marseille. 1998

Stromal Vascular Fraction - SVF

1964 **RODBELL M. et al.** **1969** **HOLLENBERG Ch** et al.

described Stromal Vascular Fraction (SVF) isolation from adipose tissue using enzymatic digestion

2001 **ZUC Patricia A.**

Multilineage Cells from Human Adipose Tissue: Implications for Cell-Based Therapies

PATRICIA A. ZUK, Ph.D.,[1,2] MIN ZHU, M.D.,[1,2] HIROSHI MIZUNO, M.D.,[2] JERRY HUANG, B.S.,[2] J. WILLIAM FUTRELL, M.D.,[3] ADAM J. KATZ, M.D.,[3] PROSPER BENHAIM, M.D.,[2] H. PETER LORENZ, M.D.,[2] and MARC H. HEDRICK, M.D.[2]

Zuk et al, Tissue Engineering 2001

2013 **ZUC Patricia A.**

Adipose-Derived Stem cells in tissue Regeneration: A review
ISRN Stem Cells, 2013, Article ID 713959

cytori
WHERE INFINITE POSSIBILITIES MEET™

2013

Emulsified Fat

Plastic and Reconstructive Surgery • October 2013

Nanofat Grafting: Basic Research and Clinical Applications

Patrick Tonnard, M.D.
Alexis Verpaele, M.D.
Geert Peeters, M.D.
Moustapha Hamdi, M.D., Ph.D.
Maria Cornelissen, Ph.D.
Heidi Declercq, Ph.D.
Ghent and Brussels, Belgium

Background: The indications for fat grafting are increasing steadily. In microfat grafting, thin injection cannulas are used. The authors describe their experience of fat injection with even thinner injection needles up to 27 gauge. The fat used for this purpose is processed into "nanofat." Clinical applications are described. Preliminary results of a study, set up to determine the cellular contents of nanofat, are presented.
Methods: Nanofat grafting was performed in 67 cases to correct superficial rhytides, scars, and dark lower eyelids. Three clinical cases are described. In

www.PRSJournal.com

see Video, Supplemental Digital Content 1,
http://links.lww.com/PRS/A855

2013

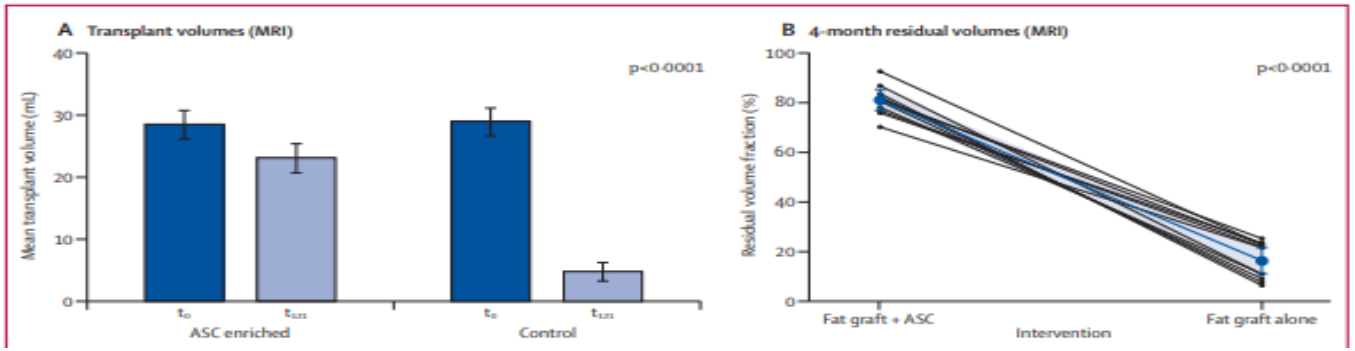
Mixture Fat Grafts and ASCs

Stig-Frederik Trojahn KOLLE

Enrichment of autologous fat grafts with ex-vivo expanded adipose tissue-derived stem cells for graft survival: a randomised placebo-controlled trial

Stig-Frederik Trojahn Kølle, Anne Fischer-Nielsen, Anders Bruun Mathiasen, Jens Jørgen Elberg, Roberto S Oliveri, Peter V Glovinski, Jens Kastrup, Maria Kirchhoff, Bo Sonnich Rasmussen, Maj-Lis Møller Talman, Carsten Thomsen, Ebbe Dickmeiss, Krzysztof Tadeusz Drzewiecki

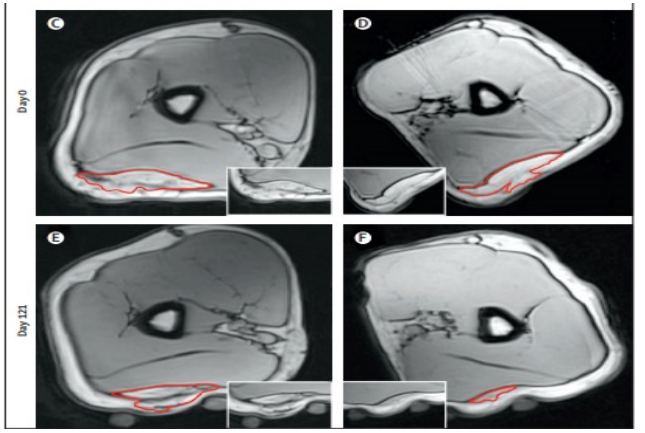
Findings 13 participants were enrolled, three of whom were excluded. Compared with the control grafts, the ASC-enriched fat grafts had significantly higher residual volumes: 23·00 (95% CI 20·57–25·43) cm³ versus 4·66 (3·16–6·16) cm³ for the controls, corresponding to 80·9% (76·6–85·2) versus 16·3% (11·1–21·4) of the initial volumes, respectively (p<0·0001). The difference between the groups was 18·34 (95% CI 15·70–20·98) cm³, equivalent to 64·6% (57·1–72·1; p<0·0001). No serious adverse events were noted.



THE LANCET

2013

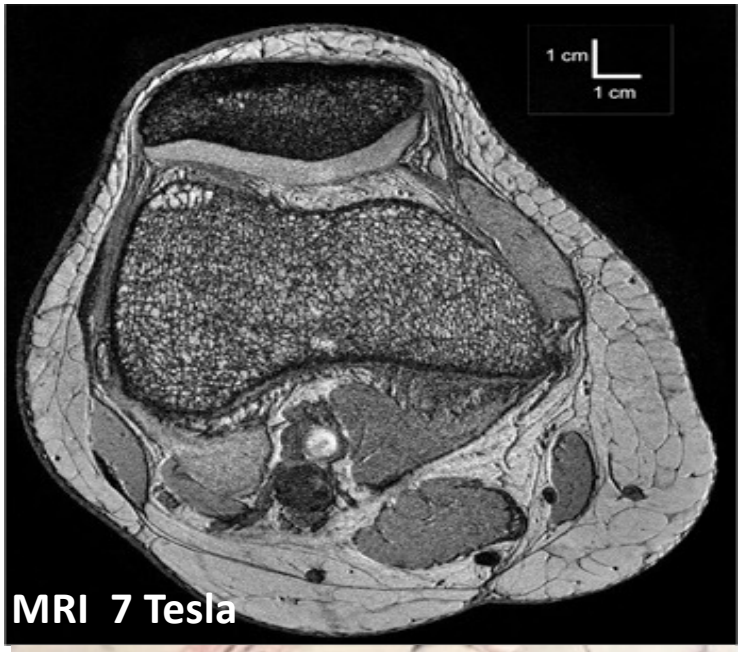
20 millions ASCs / mL de graisse
= 650 millions d' ASCs !!!
Suivi sur 4 mois…



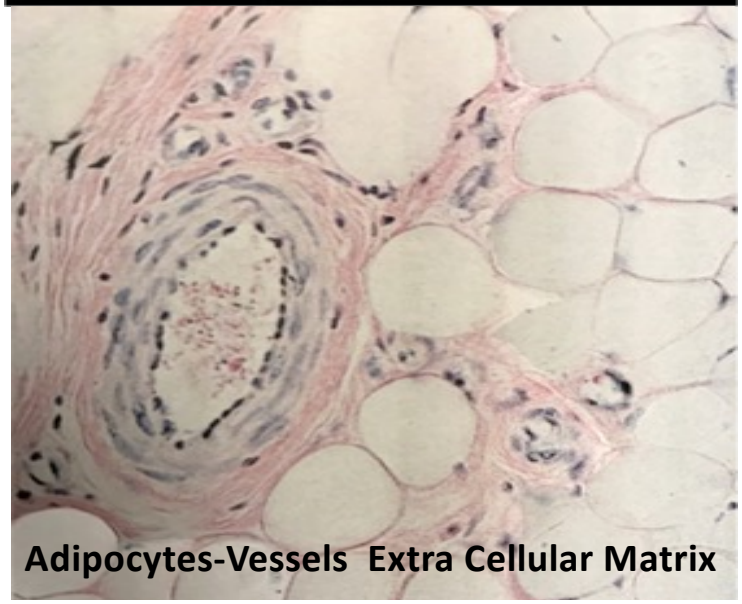
M4

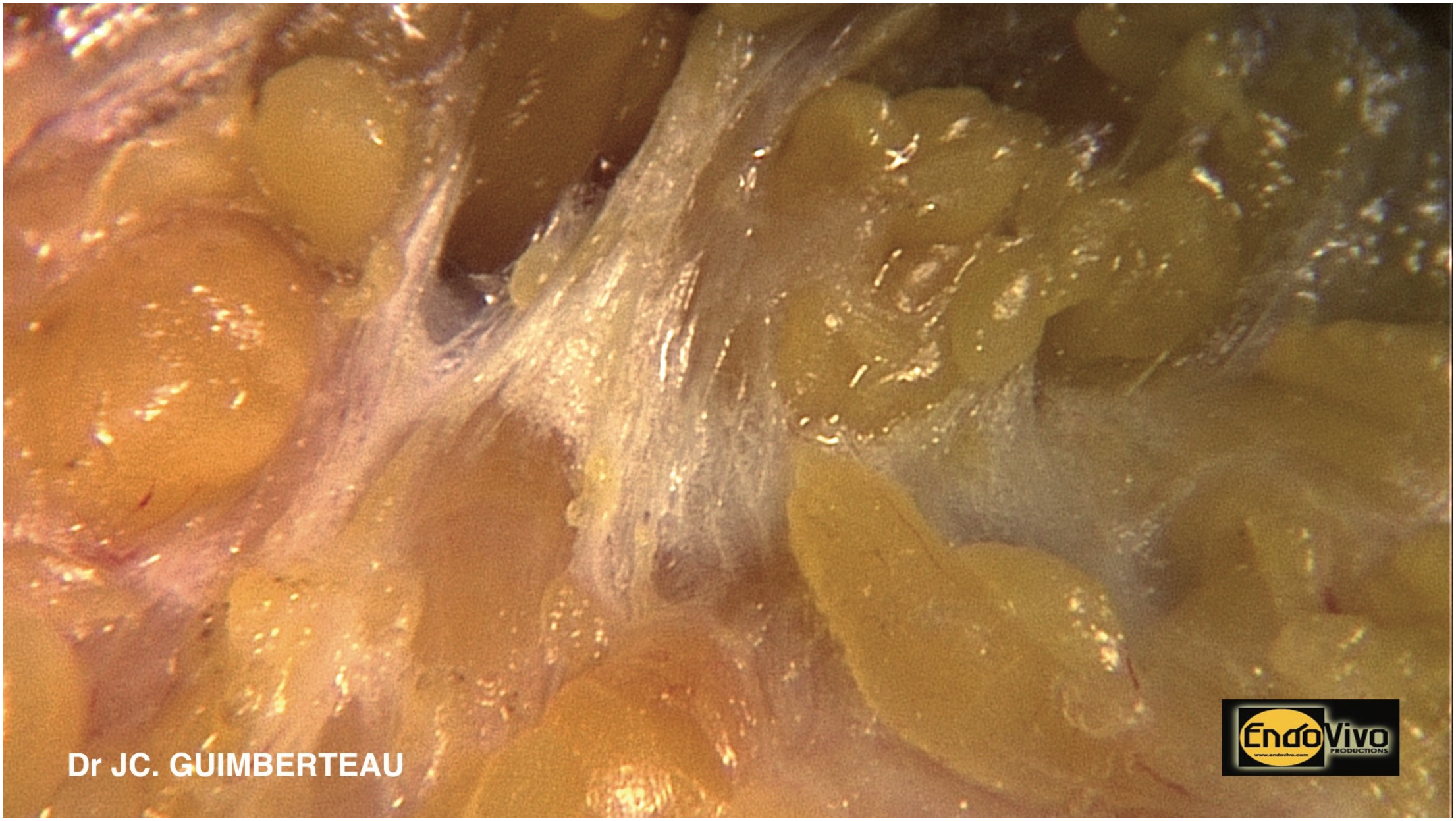
+ ASCs Control

- **PRODUCTS**
- **MEDICAL DEVICES**
- **TECHNIQUES**
  - **HARVESTING**
    - **MANUAL**
    - **ASSISTED**
  - **PREPARATION**
    - **DECANTATION**
    - **CENTRIFUGATION**
    - **FILTRATION**
    - **MECHANICAL PREPARATION**
  - **INJECTION**



MRI 7 Tesla


Adipocytes-Vessels Extra Cellular Matrix


Dr JC. GUIMBERTEAU
EndoVivo
PRODUCTIONS

Milli Fat
Microfat
Preparation of Fat

Mechanical Preparation Devices

- P. Tonnard
- Tulip®
- Hy Nanofat®
- Emulsfat®

EMULSIFICATION

- Microlyser®
- Adinizer®
- Boost®

MICRONIZATION

- Lipocube®
- Lipogems®
- ...

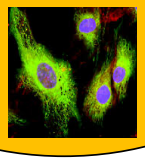
Enzymatic Preparation

ATMP
Advanced Therapy Medicinal Products

Mechanical Preparation

SVF
Stromal Vascular Fraction

MSCs
Mesenchymal Stem Cells



>10µm

SVT
Stromal Vascular Tissue
SVF Gel
Lipocondensation

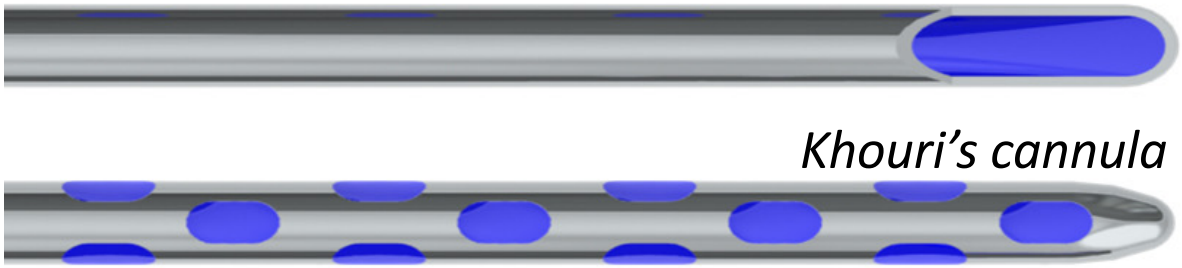
SVF
Stromal Vascular Fraction

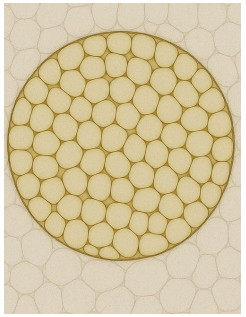
Mixed Products

MILLI

Coleman's cannula

Khouri's cannula





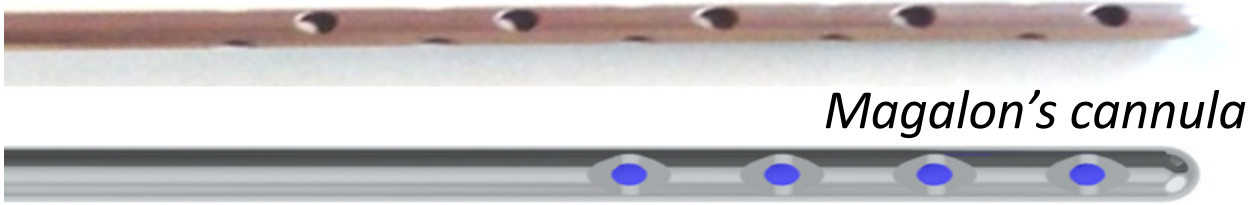
Dimensions of Fat Lobules

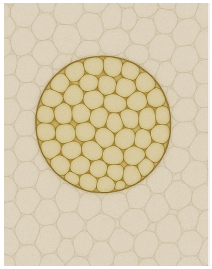
>/= 2mm

MICRO

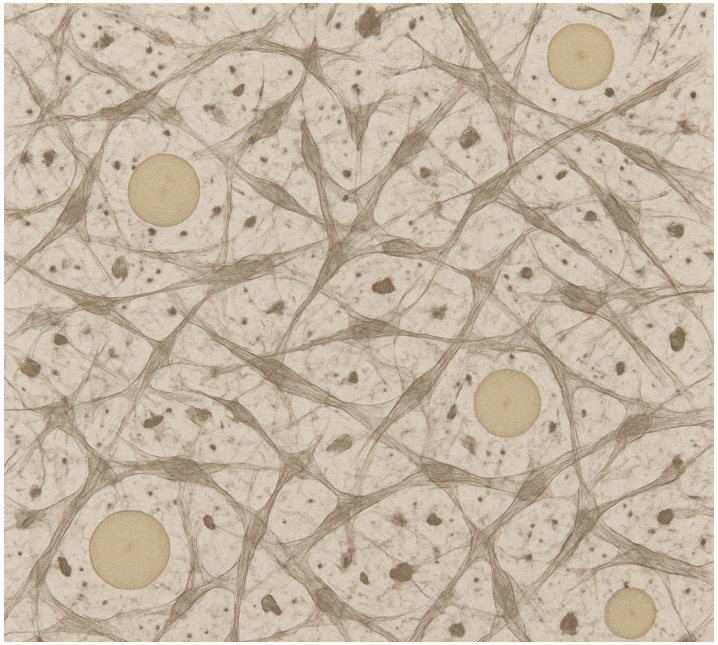
Sorensen's cannula

Magalon's cannula

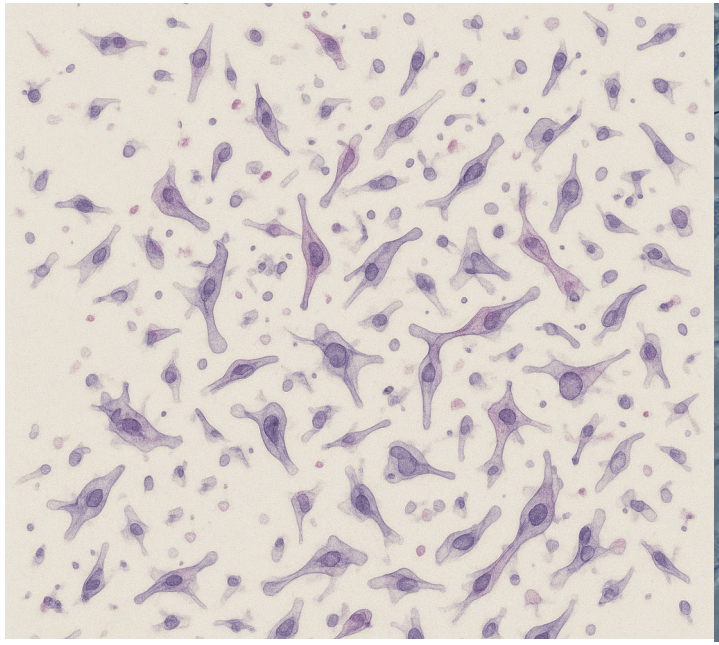




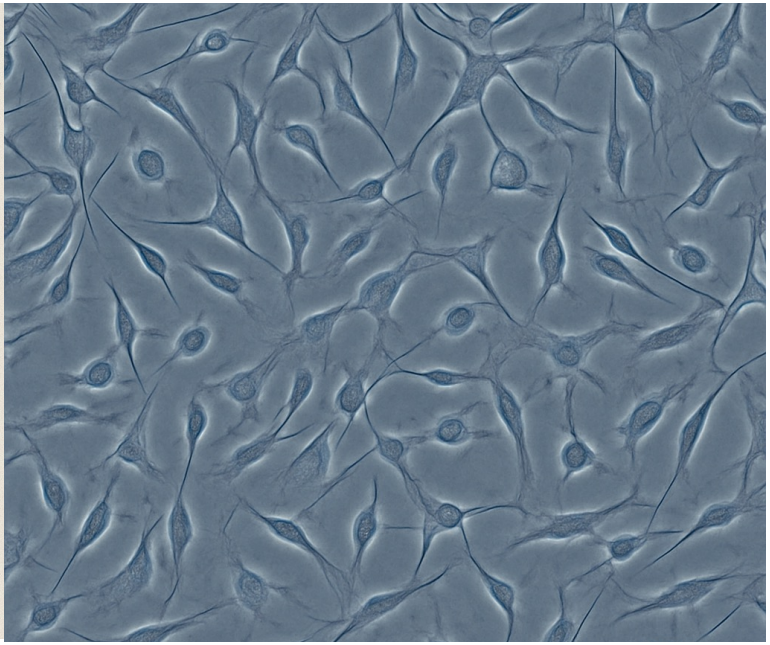
</= 1mm



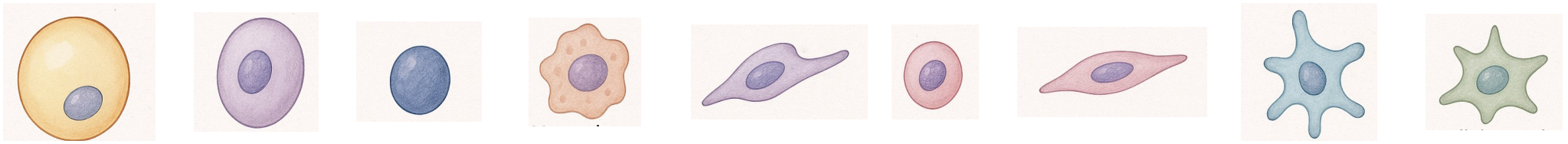
Mechanical Stromal Vascular Tissue



Enzymatic Stromal Vascular Fraction



Adipose Tissue Stem Cell Culture

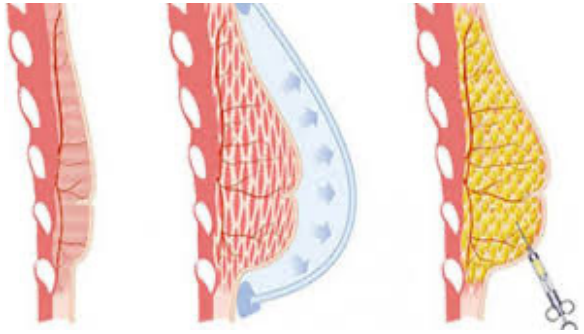


Adipocyte Adipoblast Lymphocyte Macrophage Fibroblast Endothelial cell Endothelial progenitor cell Pericyte Mesenchymal stem cell

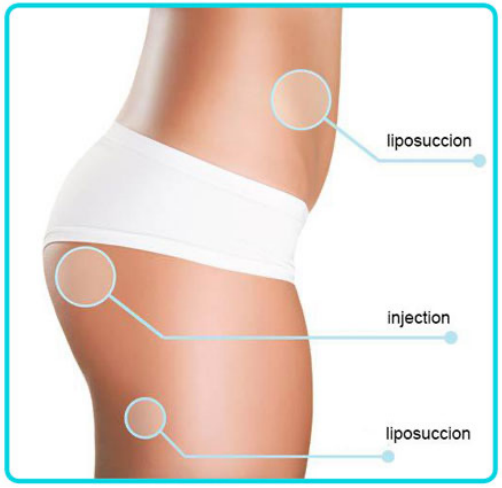
Big volume Fat Harvesting

General Anaesthesia

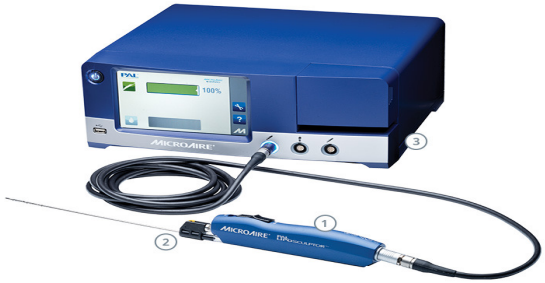
- **Breast**



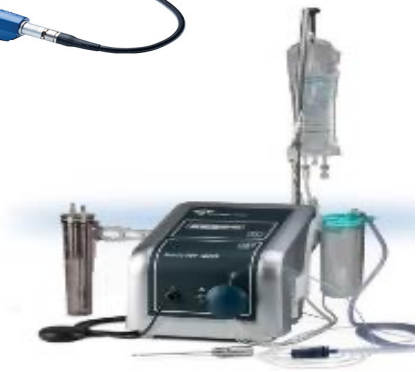
- **Buttock**



MicroAire
PAL®
liposuction system



Human Med
body-jet® devices



Alma Lasers

Lipolife ™

Möller Medical

Workstation

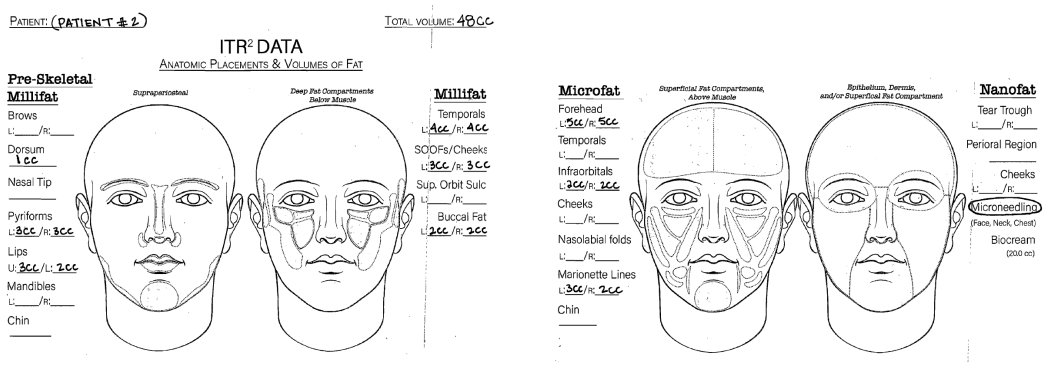
Neosyad

Adimate

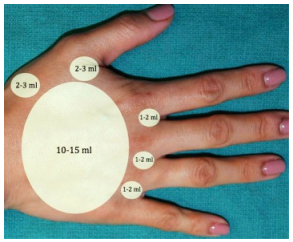
Small volume Fat Harvesting

Local Anaesthesia

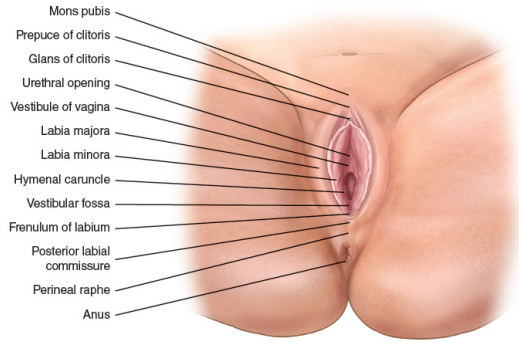
- **Face**



- **Hand**



- **Genital area**

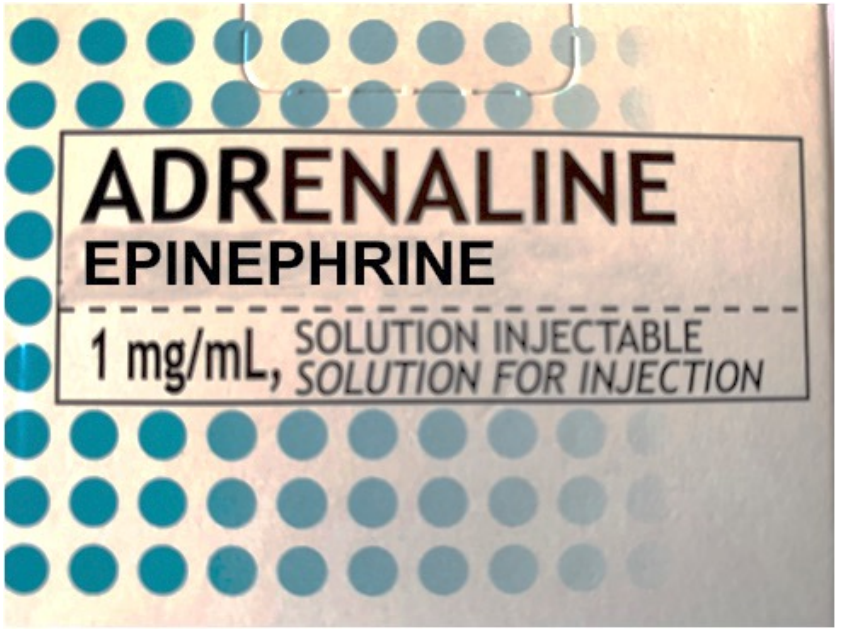


PROTOCOL Local Anaesthesia

Tumescent ANESTHESIA

Klein fluid formula:	Cytori fluid formula: **300ml Fluide 150ml Graisse**
• 500 mL of saline solution	• 250 mL of Lactated Ringer's solution
• 25 mL of 1% lidocaine 250mg	• 10 mL of 1% lidocaine 100mg
• 0,5 mg of epinephrine	• 0,5 mg of epinephrine
6ml of NaH_2CO_3 Sodium bicarbonate	

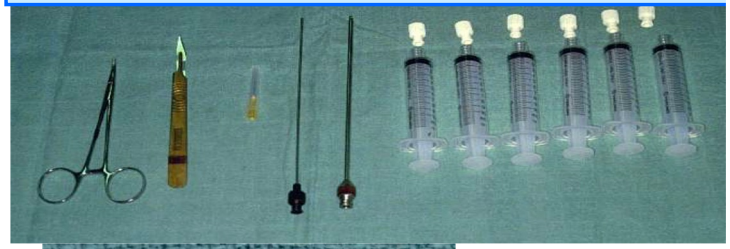
- maximum safe dosage
45mg/kg



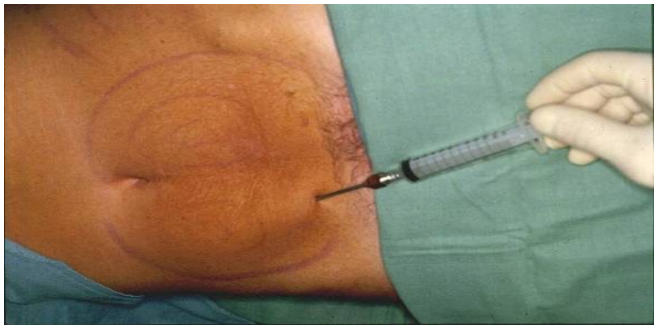
- safe dosage
1mg/l

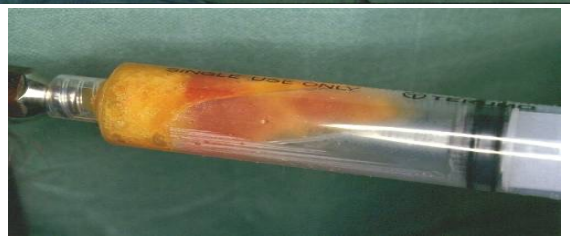
I - MILLI - Sydney COLEMAN

HARVESTING



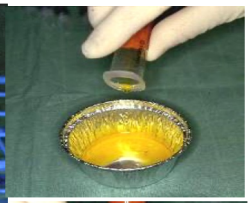
2,23mm

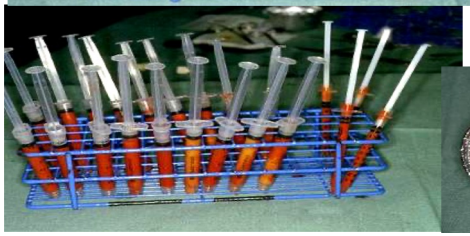




PURIFICATION

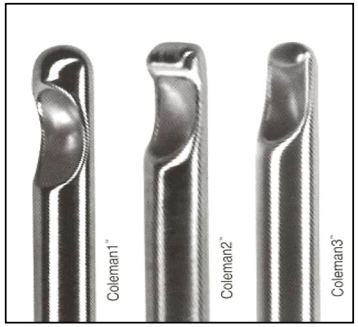
3000 RPM - 3 min -1200G

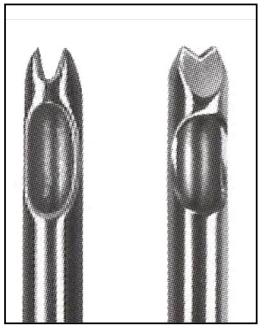




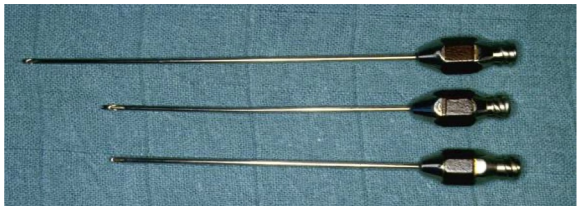
REINJECTION

1mm incision with a #11 surgical blade



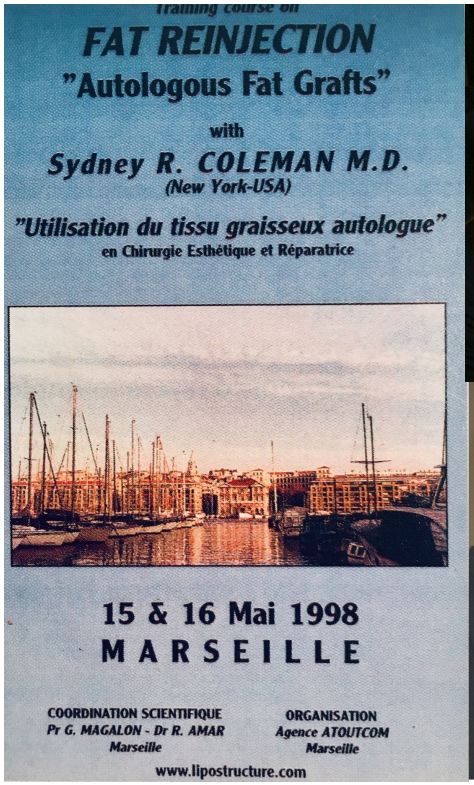


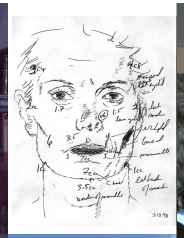
17G cannula (O.D.=1,50mm)
Distal opening 2 mm
1 ml LUER LOCK syringue



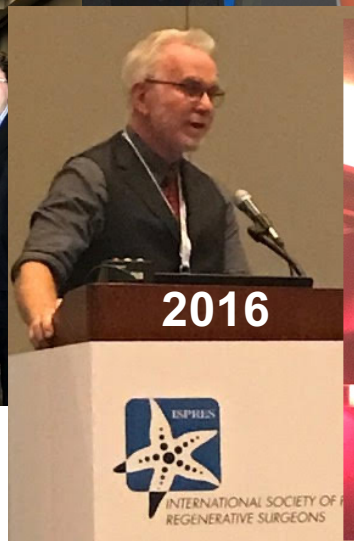
S.R.COLEMAN's placement cannula : 17 G

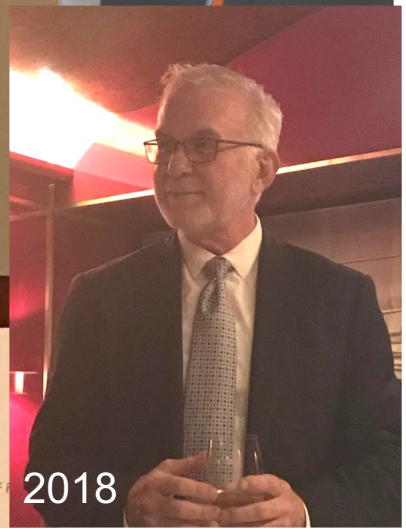
Cannula creates several tunnels



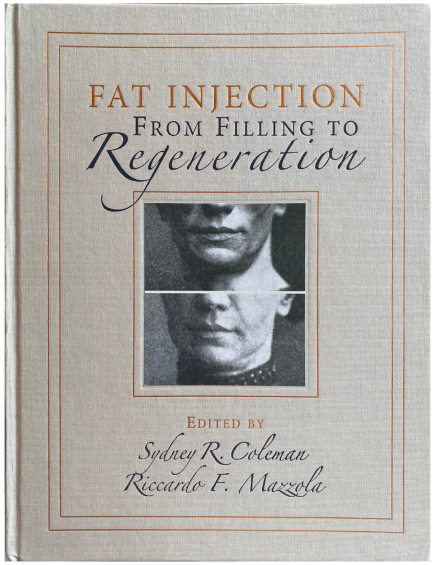


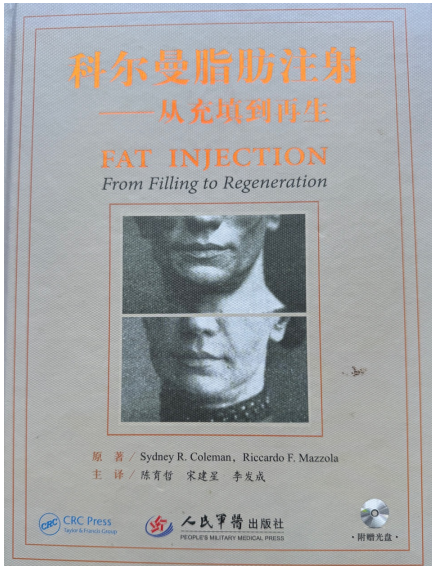
Sydney R. COLEMAN, M.D.





2009

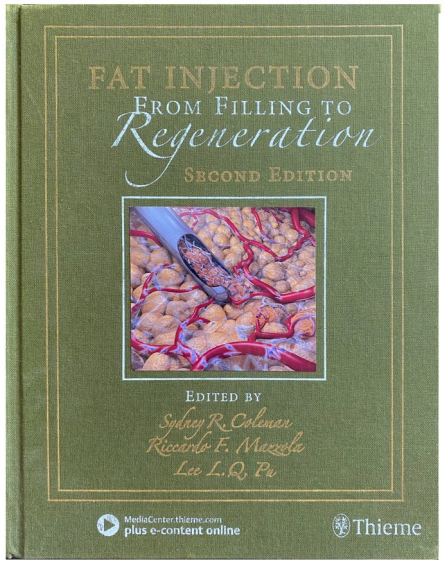


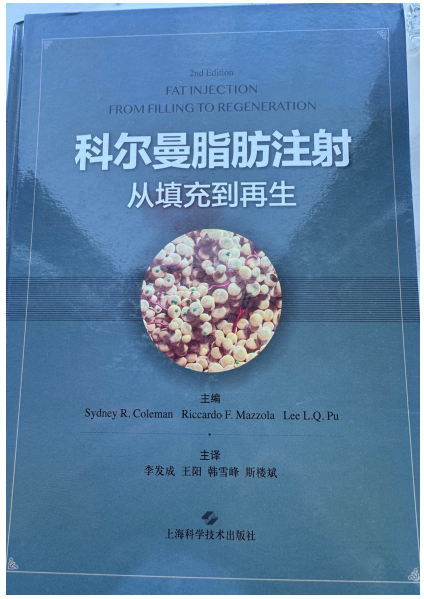


Edited by Sydney R. Coleman

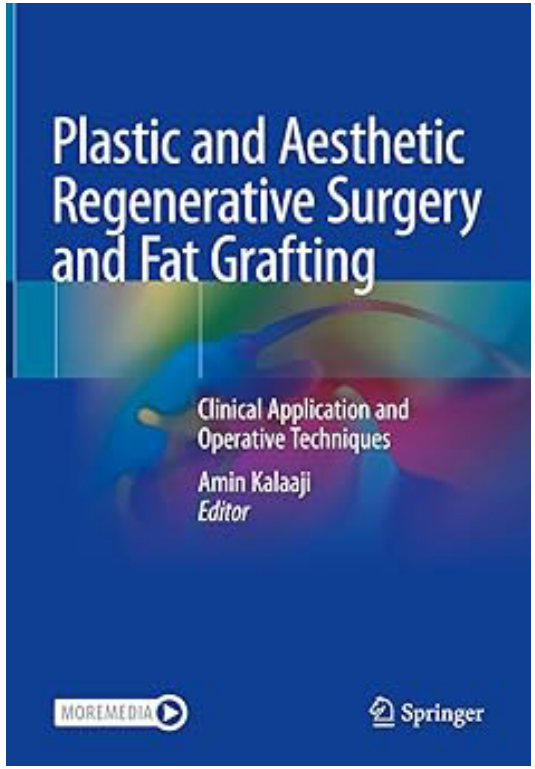
Translated into Chinese

2018





2022

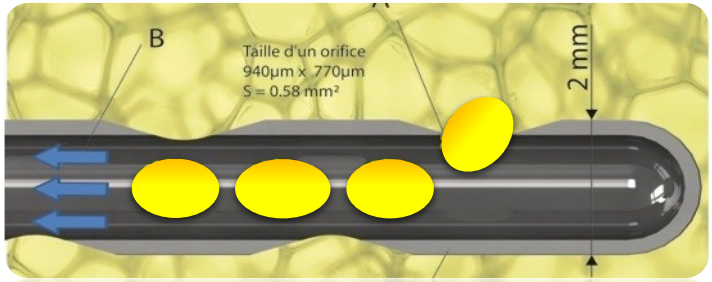


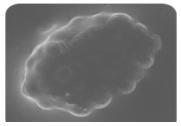
II - MICRO material

HARVESTING CANNULA

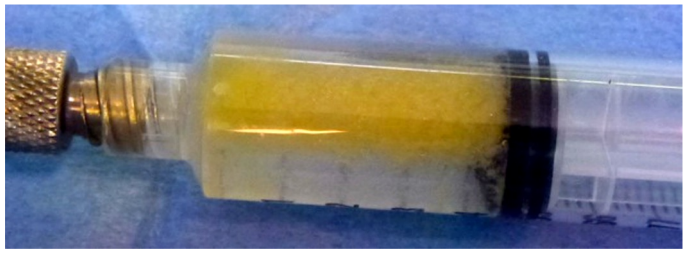
Ø=2mm – 14 Gauge – 130mm

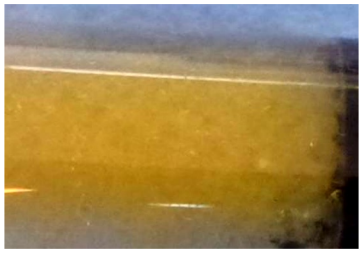
S=0.58 mm^2

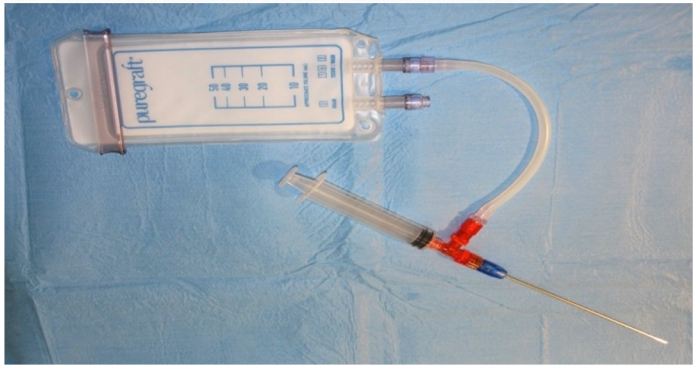




Lobula
600 µm





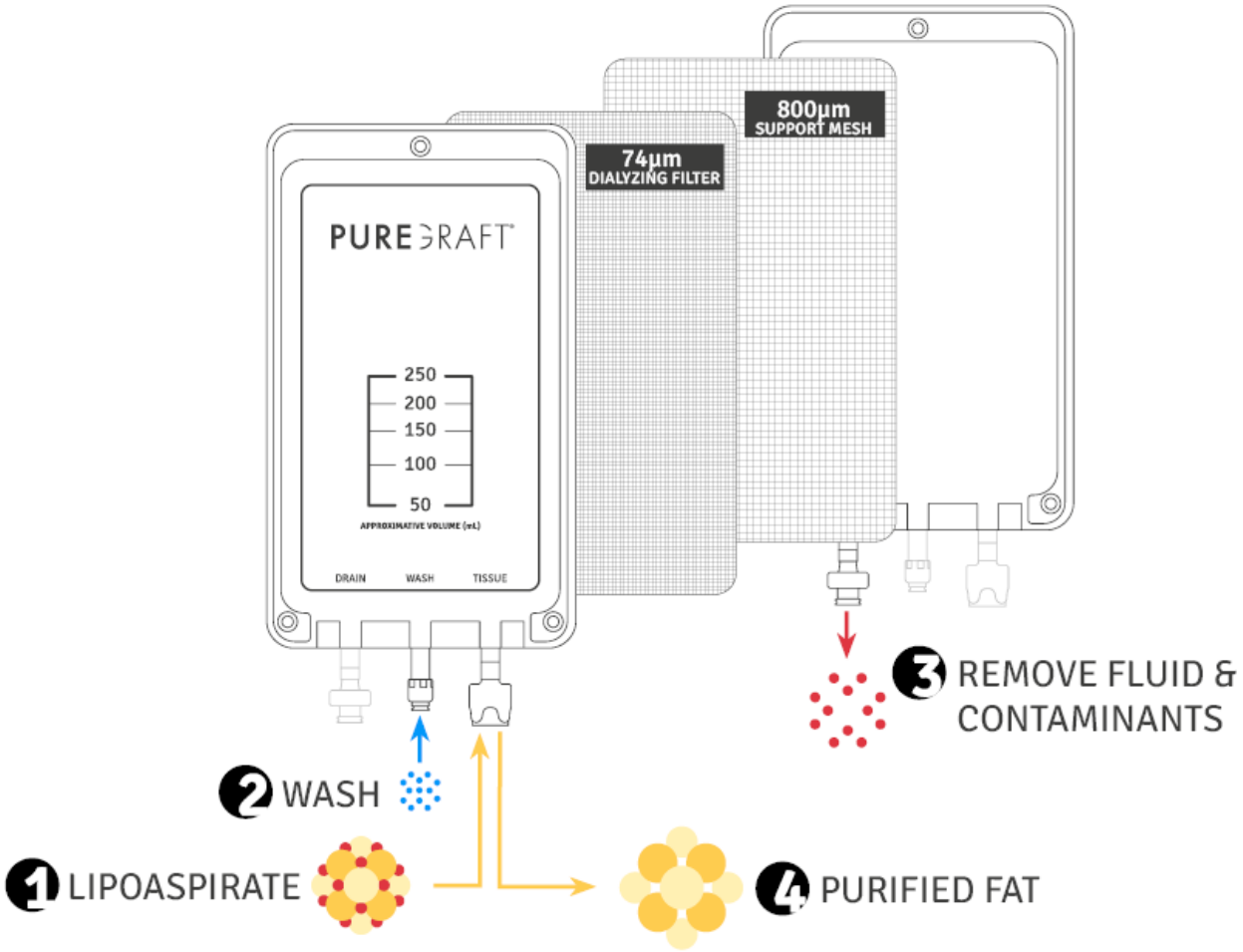


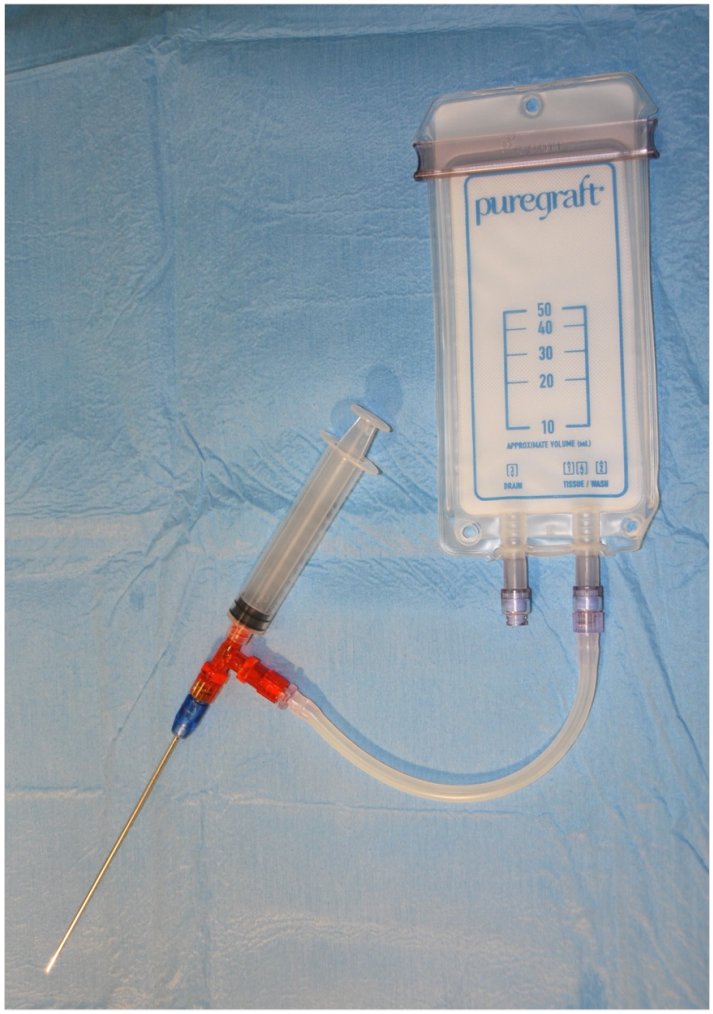
FILTRATION BAG CLOSED SYSTEM

INJECTION CANNULA

Ø=0.8mm – 21 Gauge – 40mm

FILTRATION BAG






50
40
30
20
10

Mesenchymal Stromal Cells (MSC)

Hitomi Eto, M.D.
Harunosuke Kato, M.D.
Hirotaka Suga, M.D.
Noriyuki Aoi, M.D.
Kentaro Doi, M.D.
Shinichiro Kuno, M.D.
Kotaro Yoshimura, M.D.

Tokyo, Japan

The Fate of Adipocytes after Nonvascularized Fat Grafting: Evidence of Early Death and Replacement of Adipocytes

Plastic and Reconstructive Surgery • May 2012

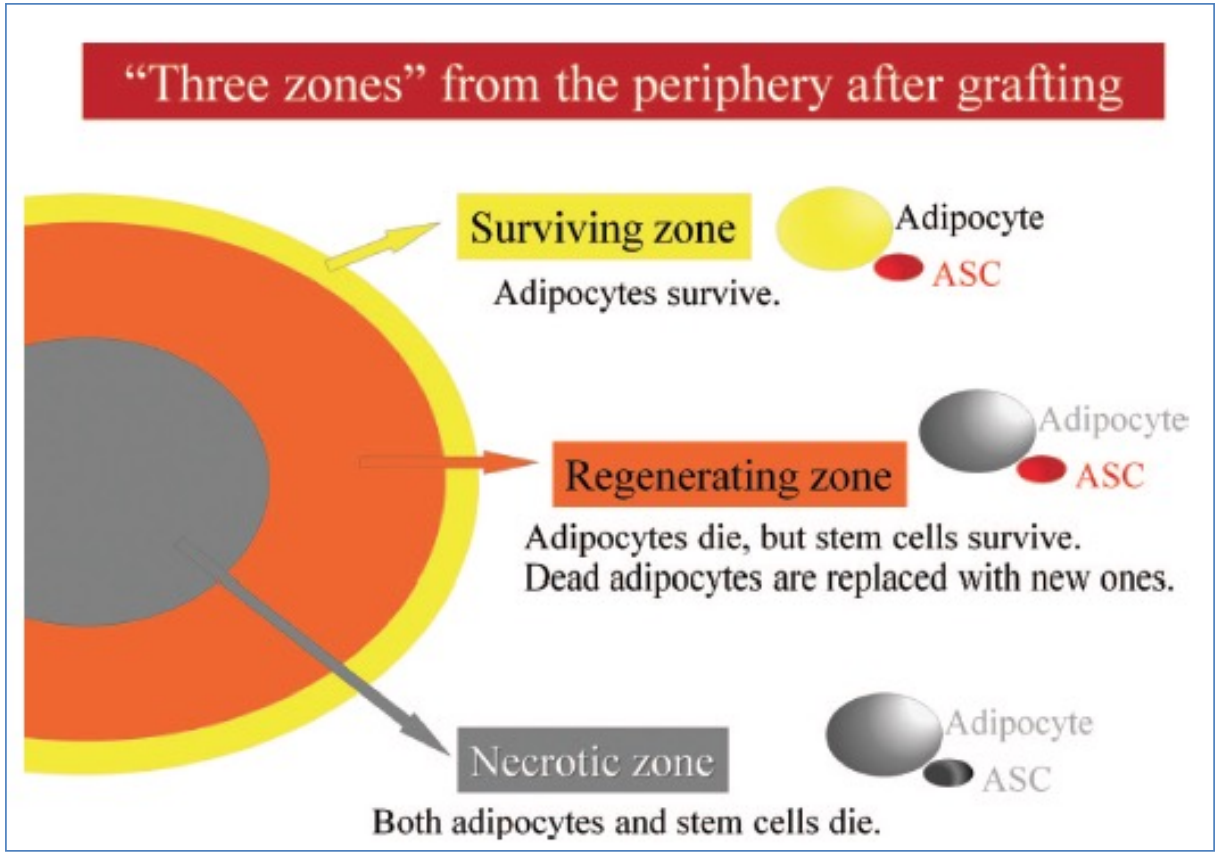


Fig. 6. Conclusive schema for three zones of the grafts. The most superficial zone is the "surviving zone," which is less than 300 μm thick. In the surviving zone, both adipocytes and adipose-derived stromal cells (*ASCs*) survive. The second zone is the "regenerating zone," the thickness of which varies depending on the microenvironmental conditions such as vascularity of and attachment to the surrounding tissue. In this zone, adipocytes die as early as day 1, but adipose-derived stromal cells survive and provide new adipocytes to replace the dead ones. The most central zone is the "necrotic zone," where both adipocytes and adipose-derived stromal cells die, no regeneration is expected, and the dead space will be absorbed or filled with scar formation.

COSMETIC

Comparison of Three Different Fat Graft Preparation Methods: Gravity Separation, Centrifugation, and Simultaneous Washing with Filtration in a Closed System

Min Zhu, M.D.
Steven R. Cohen, M.D.
Kevin C. Hicok, M.S.
Rob K. Shanahan, B.S.
Brian M. Strem, Ph.D.
Johnson C. Yu, B.S.
Douglas M. Arm, Ph.D.
John K. Fraser, Ph.D.
San Diego, Calif.

Background: Successful long-term volume retention of an autologous fat graft is problematic. The presence of contaminating cells, tumescent fluid, and free lipid in the graft contributes to disparate outcomes. Better preparation methods for the fat graft before transplantation may significantly improve results.
Methods: Subcutaneous fat from 22 donors was divided and processed using various graft preparation methods: (1) no manipulation control, (2) gravity separation, (3) Coleman centrifugation, and (4) simultaneous washing with filtration using a commercially available system (Puregraft; Cytori Therapeutics, Inc., San Diego, Calif.). Fat grafts from various preparation methods were examined for free lipid, aqueous liquid, viable tissue, and blood cell content. Adipose tissue viability was determined by measuring glycerol release after agonist induction of lipolysis.
Results: All test graft preparation methods exhibited significantly less aqueous fluid and blood cell content compared with the control. Grafts prepared by washing with filtration exhibited significantly reduced blood cell and free lipid content, with significantly greater adipose tissue viability than other methods.
Conclusion: Washing with filtration within a closed system produces a fat graft with higher tissue viability and lower presence of contaminants compared with grafts prepared by alternate methods. (*Plast. Reconstr. Surg.* 131: 873, 2013.)

OPEN

EXPERIMENTAL

Effect of Washes and Centrifugation on the Efficacy of Lipofilling With or Without Local Anesthetic

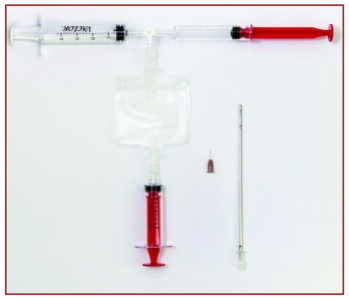
Anne-Claire Girard, PhD*
Sophie Mirbeau, MSc*
Lydie Gence, MSc*
Vincent Hivernaud, MSc*†
Pierre Delarue, MD‡
Olivier Hulard, MD§
Franck Festy, PhD*
Regis Roche, PhD*

Background: Among the different parameters that influence fat graft survival and lipofilling success, the use of local anesthetic and the way to process the fat before injection have often been pointed out. Likewise, we evaluated different techniques for processing adipose tissue before its injection and analyzed the quality of the grafts.
Methods: Adipose tissue from the same patient was gently harvested from one side of the abdomen after infiltration of a tumescent solution without lidocaine and from the other side of the abdomen using a tumescent solution containing lidocaine 2%. Harvested tissue was prepared with different protocols, from simple decantation to advanced protocols including single or multiple washes and centrifugations. Each type of processed adipose tissue was then injected subcutaneously into immunodeficient mice. Adipose grafts were collected after 1 month and analyzed by histology with a detailed scoring method.
Results: After lidocaine use, decantation protocol led to adipose grafts of poor quality with high resorption rate and oil vacuole formation. Larger grafts were obtained after centrifugation, but centrifugation alone resulted in increased fibrosis and necrosis, with or without the use of lidocaine. Finally, multiple washes and centrifugations greatly improved the quality of the lipografts.
Conclusions: Centrifugation alone is not sufficient and must be associated with multiple washes to improve graft quality. This article aims to provide further evidence of lidocaine and washing/centrifugation effects in fat grafting to provide easy tips aimed at ensuring graft efficiency with a long-term clinical outcome. *(Plast Reconstr Surg Glob Open 2015;3:e496; doi: 10.1097/GOX.0000000000000465; Published online 27 August 2015.)*

III - MECHANICAL PREPARATION OF FAT
SVT Stromal Vascular Tissue

EMULSFAT

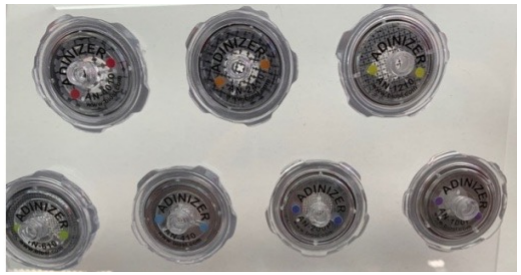
HY TISSUE -NANOFAT



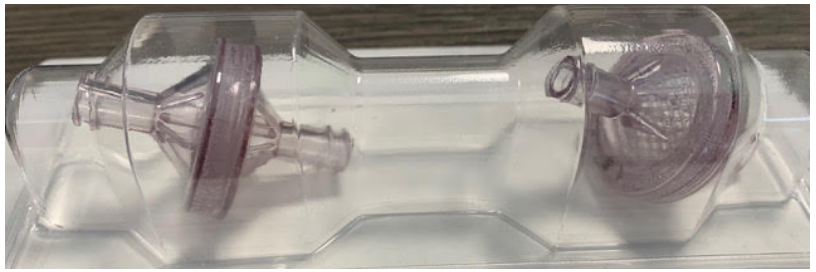
TULIP

LIPOCUBE

ADINIZER



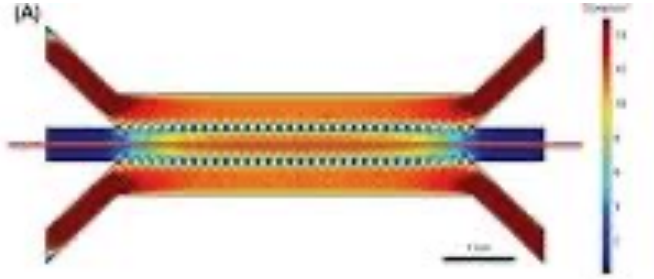
Mini BOOST



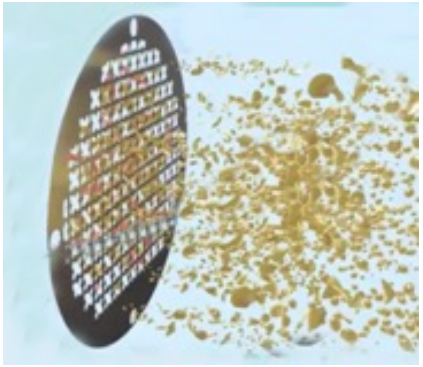
MICROLYSER

Choose a Mechanical Preparation Kit

- Emulsification: **shear force**



- Micronization



- Final size with or without filter:

2400µ 1200µ 600µ 400µ 200µ 120µ 100µ

No enzyme - Mechanical production
Inside Operating room
SVF cells – Oil – Adipocytes ?

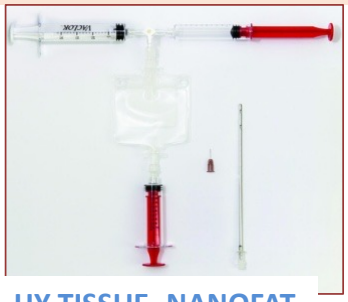
2024

Hôpitaux Universitaires de Marseille | ap hm

Ongoing research from Marseille University hospital

BIOLOGICAL QUALITY OF SVF FROM NANOFAT OBTAINED WITH COMMERCIAL DEVICES

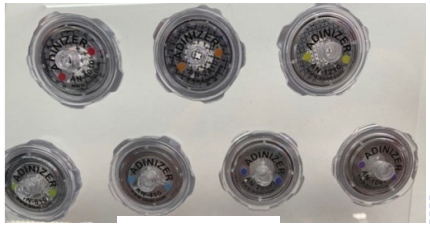
EMULSFAT



HY TISSUE -NANOFAT

TULIP

LIPOCUBE



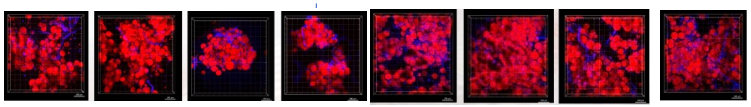
ADINIZER

BOOST

Mini BOOST

MICROLYSER

	Viability	Recovery yield Viable nucleated cells / cc of AT	Cellular composition
Higher device	91.8 ± 8.5 %	838 250 ± 636 014	Regenerative cells 49.7 ± 20.4 % Leukocytes 28.9 ± 10.5 %
Lower device	83.6 ± 12.4 %	95 550 ± 96 337	Regenerative Cells 34.3 ± 29.4 % Leukocytes 52.6 ± 11.4 %



ADIPOCYTES IN ALL EMULSIFIED FAT +++

MECHANICAL PREPARATION

I. LOCATION AND DEPTH OF SAMPLING

II. INFILTRATION OR NOT ?

III. SIZE AND QUALITY OF THE SYRINGES

IV. CANNULAS

- SIZE OF THE HARVESTING CANNULA
- SIZE AND NUMBERS OF HOLES
- SHARP MICROPORTS

V. PURIFICATION STEP OF FAT:

- DECANTATION
- CENTRIFUGATION
- FILTRATION

VI. KIT CHOICE:

- FAT EMULSIFICATION
- FAT MICRONIZATION

VII. SIZE OF THE FINAL FILTER

WE NEED VERY PRECISE PROTOCOL WITH BIOLOGICAL CHARACTERIZATION OF THE FINAL PRODUCT

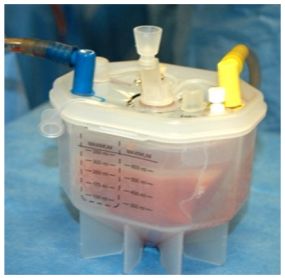
Each modification changes the final product

IV – STROMAL VASCULAR FRACTION

ADIPOSE DERIVED REGENERATIVE CELLS - ADRCs

- **MANUAL TREATMENT** in a clean room or laboratory according to the cGMP
- **AUTOMATIC TREATMENT** using a CE marked device, labeled to replace, repair, reconstruct or increase soft tissue defects.

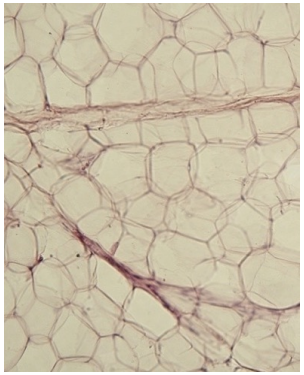
CELUTION®



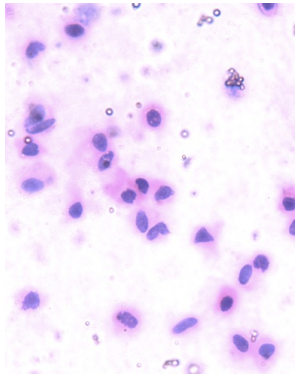
GID TECHNOLOGY™

ACS™

Adipose-Related Terminology



Enzyme Digestion



Cell Culture

Aspirated Adipose Tissue

Cell Type	Frequency
Adipocytes	**~50%**
Blood Vessel Cells	25%
Blood Cells & Macrophages	25%
Stem Cells	~1%

Stromal Vascular Fraction

Cell Type	Frequency
Adipocytes	0%
Blood Vessel Cells	**~50%**
Blood Cells & Macrophages	~50%
Stem Cells	1-2%

ADSCs

Cell Type	Frequency
Adipocytes	0%
Blood Vessel Cells	0%
Blood Cells & Macrophages	0%
Cultured ADSCs	**100%**

LEGAL ASPECTS RELATING TO THE STEM CELL CRITERIA FOR ATMPS

10.12.2007 EN Official Journal of the European Union L 324/121

REGULATION (EC) No 1394/2007 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL

of 13 November 2007

on advanced therapy medicinal products and amending Directive 2001/83/EC and Regulation (EC) No 726/2004

(Text with EEA relevance)

ATMP : Advanced Therapy Medicinal Products

Cells or Tissues have been subject to **substantial manipulation**, so that biological characteristics, physiological functions or structural properties relevant for the intented indication or regeneration are achieved

OR

Cells or Tissues are **not intented to be used for the same essential function** in the recipient as in the donor **(non homologous use)**

MTI : Médicaments de Thérapie Innovante


AP HM

European pharmacopoeia 5.6

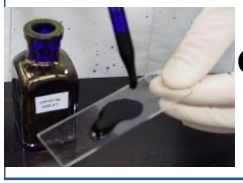
STERILITY TESTING

⇨**AEROBIC and ANAEROBIC inoculation**

⇨**INCUBATION : 10 days**

⇨**Recommendations for sampling**

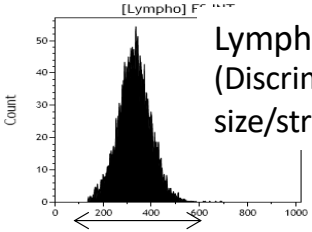
Final product volume (ml)	Inoculum volume
> 10 ml	1%
1< v <10ml	100 µl



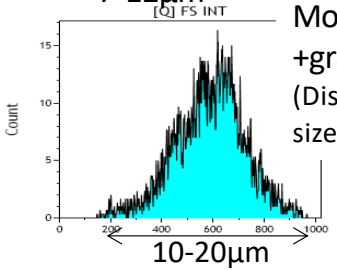
GRAM staining <u>on harvested adipose tissue</u>

prior to delivery to patient (released quality control)

CYTOMETRY

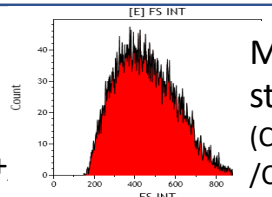


Lymphocytes
(Discrimination CD45+ size/structure)

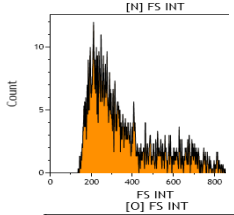


Monocytes +granulocytes
(Discrimination CD4 size/structure)

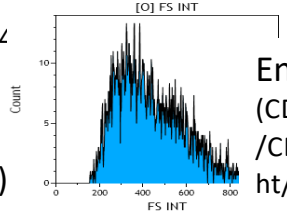
Size (FCS)



Mesenchymal stem cells
(CD45-/CD34+/CD90+/CD146-)



Endothelial Progenitor cells
(CD45/CD34bright/CD146dim/CD90+)



Endothelial cells
(CD45-/CD34dim/CD146bright/CD90+)

CELL NUMERATION AND VIABILITY

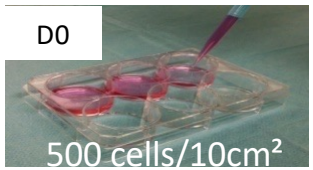
<u>Many methods</u> are available and validated

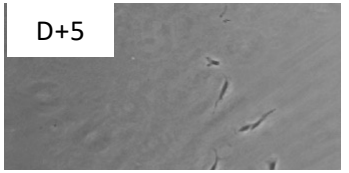
Choice of automatically method by **Nucleocounter NC-100® :**

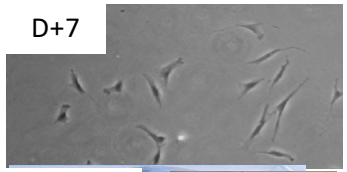
- **15 minutes**
- **Sample : 100µl**
- **Measured in duplicate**
- **Propidium iodide**
- **2 steps :**
  - **Dead cell count**
  - **Total cell count**

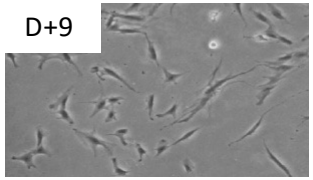
⇨SCLERADEC trial : ≥ 80% viability for the batch release

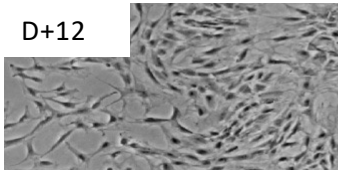
« The current gold standard for enumerating stem cells that are members of the ADSC/MSC family is the CFU-F assay in which the ability of the cells to proliferate is determined. Individual stem cells proliferate to form colonies that are counted. This process takes 10-14 days. » *John FRASER*

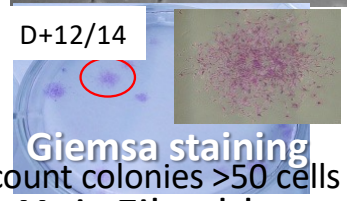












count colonies >50 cells

Clonogenic Assay: **C**olony **F**orming **U**nit-**F**ibroblast

As recommended by the International Society for Cellular Therapy

Enzymatic production
ATMPs status
Heterogeneous suspension of cells – NO ADIPOCYTES

GMP PRODUCTION & CHARACTERIZATION OF STROMAL VASCULAR FRACTION

RESEARCH Open Access

Inter-center comparison of good manufacturing practices-compliant stromal vascular fraction and proposal for release acceptance criteria: a review of 364 productions

Pauline François[1,2], Giulio Rusconi[3,4], Laurent Arnaud[5], Luca Mariotta[3], Laurent Giraudo[1], Greta Minonzio[3], Julie Veran[1], Baptiste Bertrand[6], Chloé Dumoulin[1], Fanny Grimaud[1], Luc Lyonnet[5], Dominique Casanova[6], Camille Giverne[7], Audrey Cras[8], Guy Magalon[9], Françoise Dignat-George[2,5], Florence Sabatier[1,2,9], Jeremy Magalon[1,2,9*†] and Gianni Soldati[3†]

2021

Swiss Stem Cell Foundation

294 SVF batches of therapeutic grade produced at **SSCF**

Hôpitaux Universitaires de Marseille | ap hm

70 SVF batches of therapeutic grade produced at **APHM**

	Viability	Recovery yield Viable nucleated cells / cc of AT	Cellular composition
Swiss Stem Cell Foundation **N= 294**	89.3 ± 4.3 %	254 000 ± 120 000	Regenerative cells 70.1 ± 13.1 % Leukocytes 29.8 ± 11.4 %
Hôpitaux Universitaires de Marseille ap hm **N= 70**	84.2 ± 6.0 %	225 000 ± 111 000	ASC 54,8 ± 14.0 % Leukocytes 45.2 ± 16.2 %

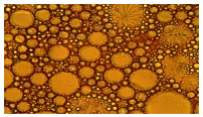
V – MIXTURES

CAL :
CELL ASSISTED LIPOTRANSFER
A POPULAR PROCEDURE…

ADIPOSE TISSUE

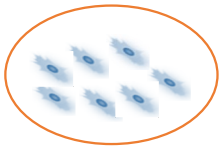
+

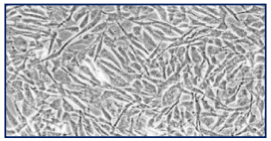
PRP



SVT
Stromal
Vascular
Tissue

SVF





Cultured
Stem Cells
(ASCs)

EASY
FAST
ECONOMICALLY VIABLE

DIFFICULT
LONG
EXPENSIVE

= **Promoting Fat Engraftment** ?

VI – INDICATIONS

CELLULAR THERAPIES

- **Volumizing effect Fat tissue: MILLI - MICRO**
  - Replacement of missing tissues with autologous fat
- **Regenerative effect Fat tissue:**
  - **Mechanical preparations**
    STROMAL VASCULAR TISSUE – EMULSIFIED or MICRONIZED FAT
    - Modified emulsified fat **- SVF Gel**
      - Lipocondensation
    - **Enzymatic preparation** - **STROMAL VASCULAR FRACTION**
- **Regenerative effect Platelet Rich Plasma**

…

RULES FOR LIPOFILLING IMPROVEMENT

1 – INFILTRATION

*Careful of lidocaine !

2 – LIPOSUCTION

Small holes cannula = better vascularization

Low negative pressure = less than 0.5 atm or 380 mmHg

3 – FAT PREPARATION

Active filtration: removes

- Tumescent fluid, Free lipids, Blood cells …

Washes are really important (even without lidocaine)

4 – FAT INJECTION

Injection of small quantities in different layers

VII – RESULTS

VOLUMIZING

IMMEDIATE EFFECT (2-6 months)

- **MILLI**
- **MICRO**

REJUVENATING

DELAYED EFFECT (12 months)

- **MECHANICAL PREPARATIONS :**

EMULSIFICATION / MICRONIZATION : "NANOFAT" **STROMAL VASCULAR TISSUE**

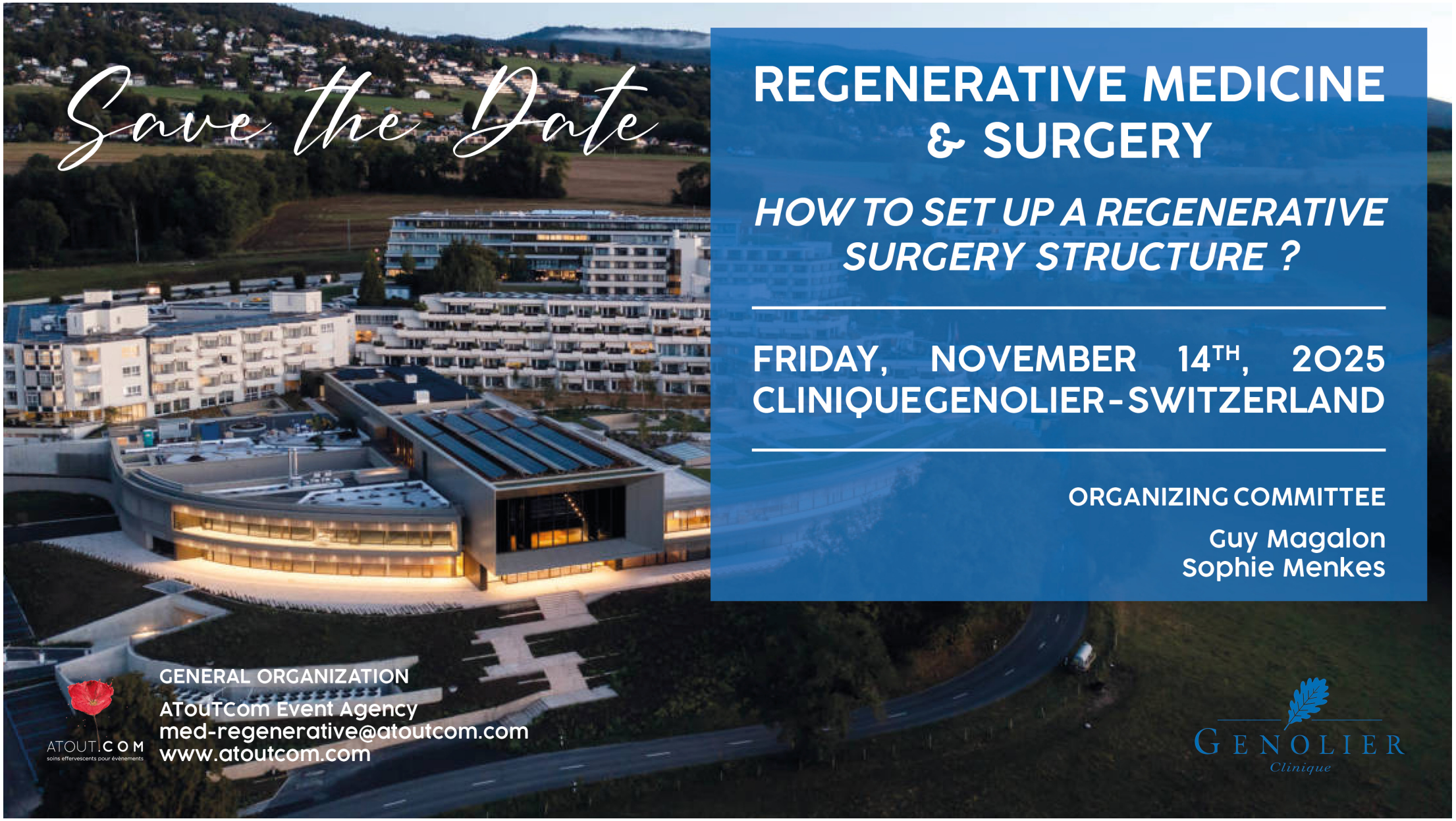
- **MECHANICAL PREPARATIONS :**

EMULSIFICATION / MICRONIZATION + CENTRIFUGATION : "NON ENZYMATIC SVF"

- **ENZYMATIC PREPARATIONS :** **STROMAL VASCULAR FRACTION**

CONCLUSION

- Cell Therapy products are manifold, and their preparations require rigorous protocols.
- Regenerative surgery is a major issue.
- Surgeons need to know the products and techniques available and choose indications.
- Advanced Therapy Medicinal Products (ATMP) with substantial manipulations are subject to very strict regulation.
- Evolution:
  - From Enzymatic Stromal Vascular Fraction to Mechanical Modified:
    - Stromal Vascular Tissue: Emulsified Fat - Micronized Fat
    - Mechanical Stromal Vascular Fraction
  - Enzymatic SVF or Stem Cells systemic use
  - Stem Cells Expansion System
  - Allogenic Stem Cells
  - Cryopreservation
  - Exosomes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REGENERATIVE MEDICINE & SURGERY
HOW TO SET UP A REGENERATIVE SURGERY STRUCTURE ?
FRIDAY, NOVEMBER 14TH, 2025
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