Regenerative medicine: Myth or reality in 2021?

Dr. Ali MODARRESSI
Privat Docent

Plastic, reconstructive & aesthetic surgery
FMH, EBOPRAS

Geneva

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Regenerative medicine

Definition

"process of **replacing**, **engineering** or **regenerating** cells, tissues or organs

to restore or **establish normal function** …..

by **stimulating the body's own repair mechanisms** … "

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Regenerative medicine market

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Regenerative medicine

Stem cells ?

Needling?

Exosomes ?

Lipofilling ?

SVF ?

Fillers ?

Laser ?

PRP ?

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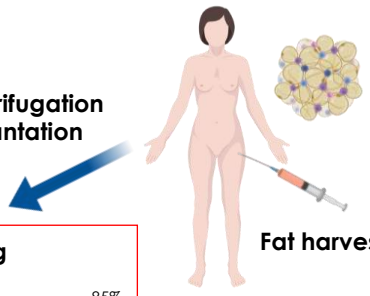
Lipofilling



Lipofilling

Adipocyte	85%
Regenerative cells	15%
Stem cells	<1%

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Lipofilling

Wound healing

Scar reduction

Radiodermitis treatment

Cervelli & al., Aesthetic Plast Surg. 2009 Klinger & al., Aesthetic Plast Surg. 2008 Phulpin & al., PRS, 2009

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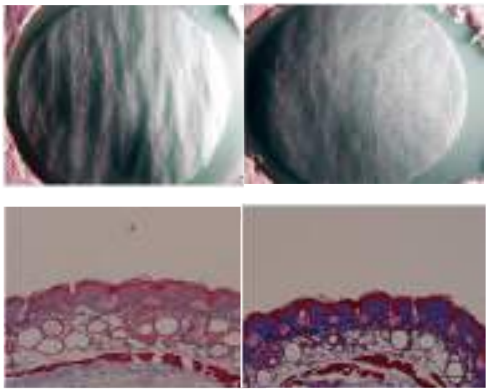
Lipofilling

Anti-wrinkle treatment

UVB irradiation on rat | UVB irradiation + fat



Kim & al., J Dermatol Sci, 2009

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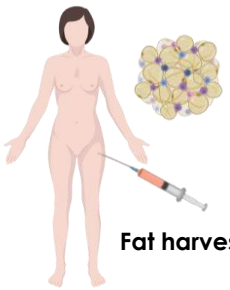
Lipofilling

Centrifugation
Decantation



Fat harvesting

LIPOFILLING

Adipocyte	85%
Regenerative cells	15%
Stem cells	<1%

Regenerative capacity

Simple to do
Low risk
Low cost (~100 CHF)
No legal issue

Gives volume

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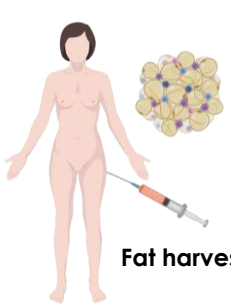
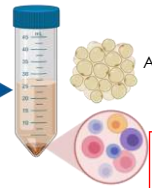
What else ….



Fat harvesting

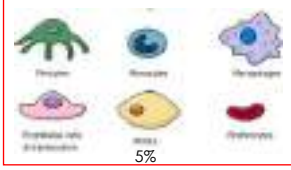
Purification



Adipocyte

Stromal vascular fraction (SVF)

Adipocyte	0%
Regenerative cells	100%



5%

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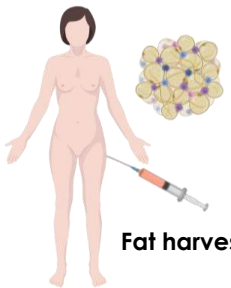
SVF

~3000 CHF
~3 hours

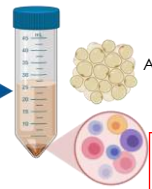
~200-500 CHF
~30 minutes



Fat harvesting

Purification

Enzymatical / mechanical



Adipocyte

Stromal vascular fraction (SVF)

Adipocyte	0%
Regenerative cells	100%

5%

~100 CHF
~10 minutes

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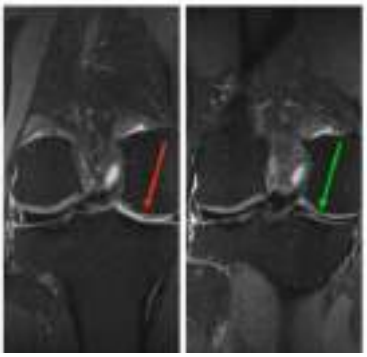
SVF / nanofat

Osteoartritis:

Simunec et al, Cells, 2020
Tsuboska et al, BMC, 2020
....



Sclerosis (hand, peribuccal)

Magalon et al, Rheumatology, 2021
Rosa et al., Worl J Stem Cells, 2021

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SVF / nanofat

Scar treatment:

Nanofat
Gu et al., JAMA Facial Plast. Surg. 2018

SVF
Wu et al., J. Transl. Med. 2013

Nanofat
Bhooshan et al. Indian J. Plast. Surg. 2018

SVF
Sung et al., Arch. Plast. Surg. 2012

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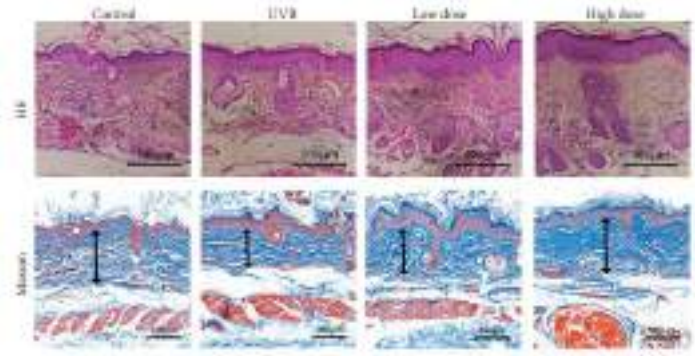
SVF / nanofat

Rejuvenation:

Tonnard et al, Clin Plast Surg, 2020
Liang et al., Cell Physiol Biochem, 2018

Nanofat
Menkes et al., PRS Global, 2020



SVF
Deng et al., Oxyd Med, 2019

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Reality…

No difference between **SVF, nanofat and lipofilling** for **scar improvement and rejuvenation**

Reivew: Stachura & al., J Clin Med, 2021

Wu et al., J. Transl. Med. 2013
Gentile et al., J. Craniofacial Surg. 2014
Carstens et al. J. Clin. Med. 2021
Elkahky et al., J. Egypt. Women's Dermatol. 2016
Zhou et al., J. Cosmet. Laser Ther. 2016
Gentile et al., J. Regen. Med. 2017
Tenna et al. Aesthetic Plast. Surg. 2017
Zayed et al., Med. J. 2017
Carstens et al. CellR4 2017
Bhooshan et al. Indian J. Plast. Surg. 2018
Gu et al., JAMA Facial Plast. Surg. 2018
Lee et al. Aesthetic Plast. Surg. 2018
Uyulmaz et al., Aesthetic Surg. J. 2018
Eitta et al. Int. J. Dermatol. 2019
Gaba et al., Indian J. Orthop. 2019
Jan et al., Ann. Plast. Surg. 2019
Shalaby et al., Med. J. 2020
Pallua et al., Clin. Plast. Surg. 2020
…..

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Reality…

No !

SVF, nanofat and lipofilling are not :

STEM CELL THERAPY

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Reality…

Joint ASPS & ASAPS Position Statement:
Stem Cells, May 2011

"Terms such as "**stem cell therapy**" or "stem cell procedure" should be reserved to describe those treatments or techniques where the collection, concentration, manipulation, and therapeutic **action of the stem cells is the primary goal,** rather than a passive result, of the treatment. "

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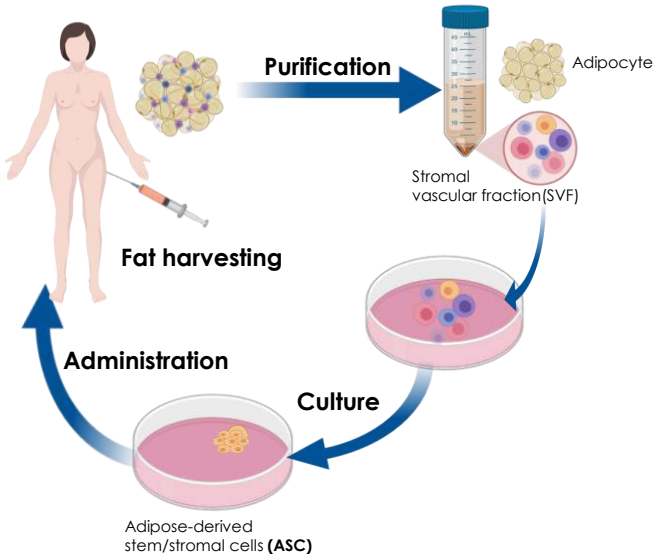
How to obtain adipose-derived stem cells (ASC)



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Adipose-derived stem cells (ASC)

www.time.com

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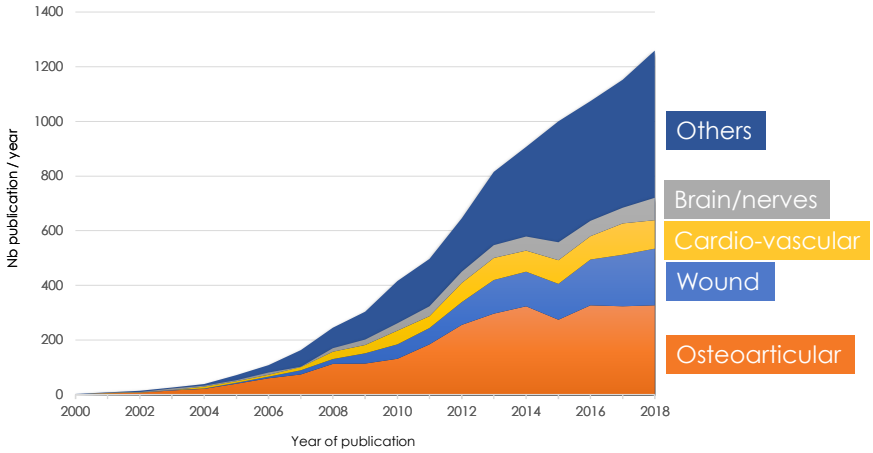
Adipose-derived stem cells (ASC): research

PubMed

10 343



Web state on February 2020

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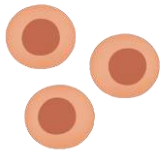
Potential clinical use of ASC

Cell therapy

Mohr & al., 2018

Zhou & al, 2018

Zhang & al., 2020



Stem cells

Duncan & al., 2017

Müller & al. 2018

Andia & al., 2019

References: Most recent and accurate review paper for each field

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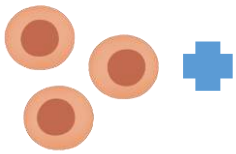
Potential clinical use of ASC

Tissue engineering


Lavernia & al., 2019

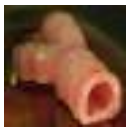

Rahmani & al. 2018


Song & al., 2018


Stem cells Scaffold


Boni & al., 2018


VanKovering & al., 2019


Khazraee & al. , 2018


Fioretta & al., 2018

References: Most recent and accurate review paper for each field

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Adipose-derived stem cells (ASC): research

PubMed

ClinicalTrials.gov

10 343

PUBLICATIONS

341

0 for aesthetic

Web state on February 2020

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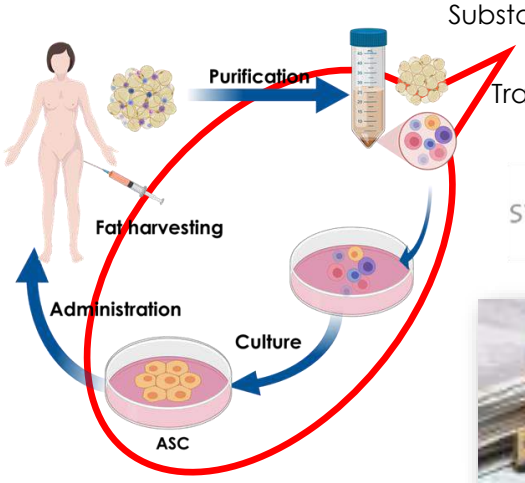
Adipose-derived stem cells (ASC) limitations

Cost

>5000 CHF

Time

2-3 weeks



Substantial manipulation

Transplant product

swissmedic
Swiss Agency for Therapeutic Products

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Adipose-derived stem cells (ASC): laws

Stem cells and laws:

Sale of cosmetic products with **stem cells derived from human tissues** is banned in US/Europe/Asia

No swissmedic authorization for use of adipose derived **stem cells** for **aesthetic / dermatology** indication

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Reality…

No scientific evidence for scar improvement by ASCs

Reivew: Stachura & al., J Clin Med, 2021

No difference between nanofat and ASCs for skin rejenuvation

Xu & al., Aestheric Plast Surg, 2018

No difference between SVF and ASCs for regeneration capacity

Bucan & al., J Plast Hand Surg, 2020
Perdomo et al., Spine, 2021
Nyberg et al., Tissue Eng, 2019

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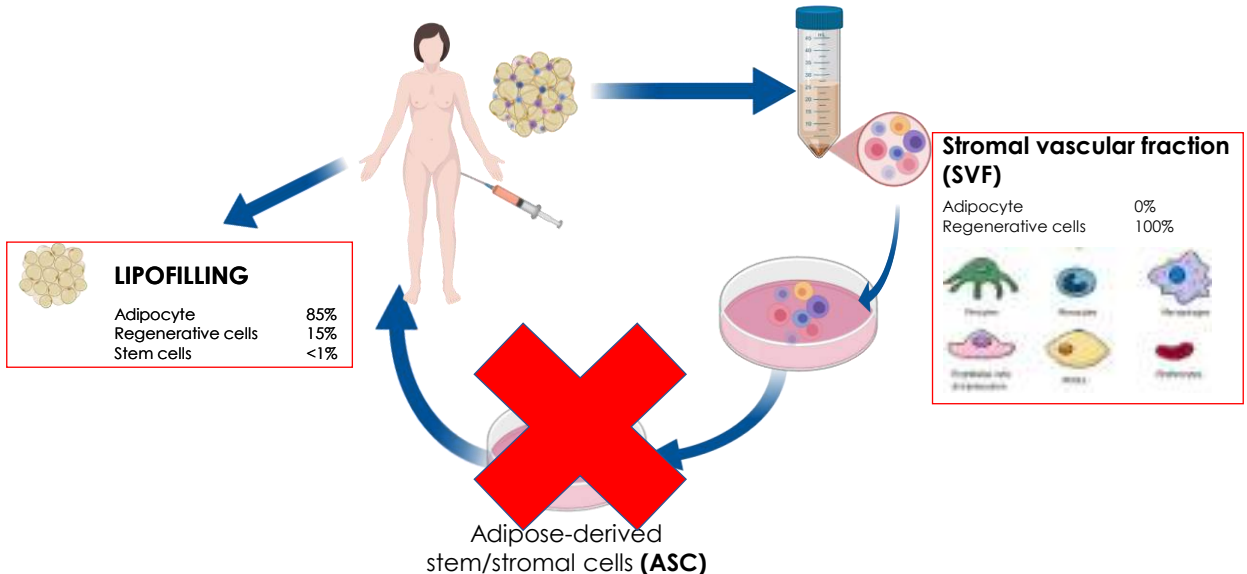
What can we do with fat ?



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Regenerative medicine

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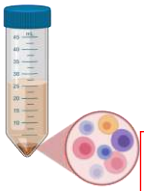
Regenerative medicine



Stromal vascular fraction (SVF)

Adipocyte	0%
Regenerative cells	100%

LIPOFILLING

Adipocyte	85%
Regenerative cells	15%
Stem cells	<1%

Exsosomes

Growth factors

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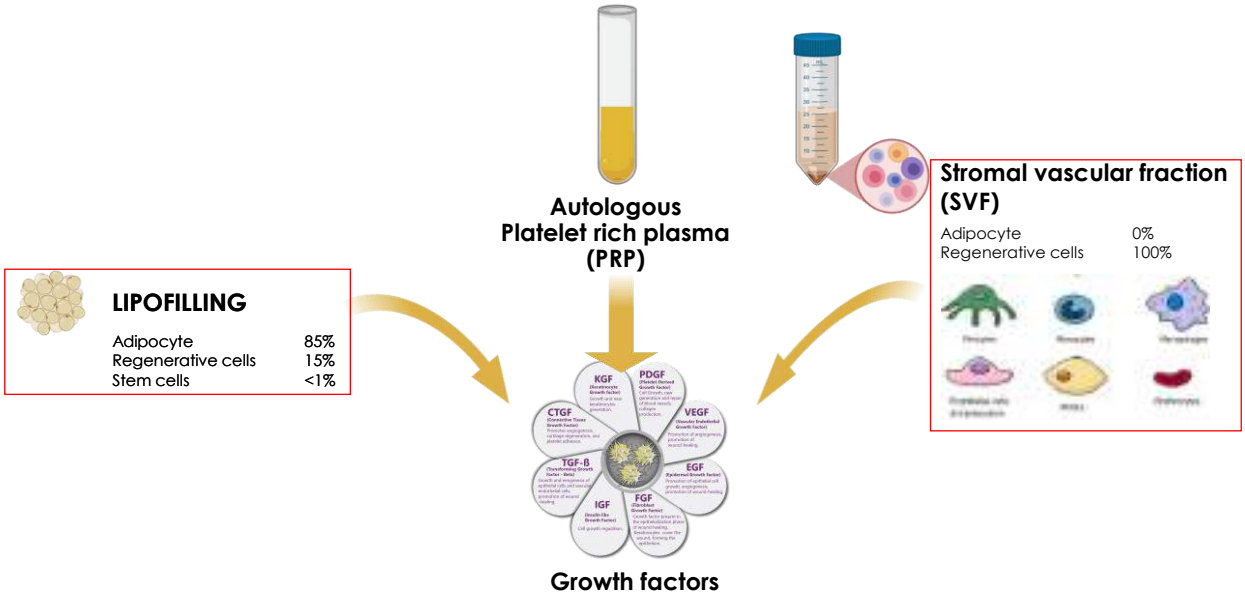
Regenerative medicine



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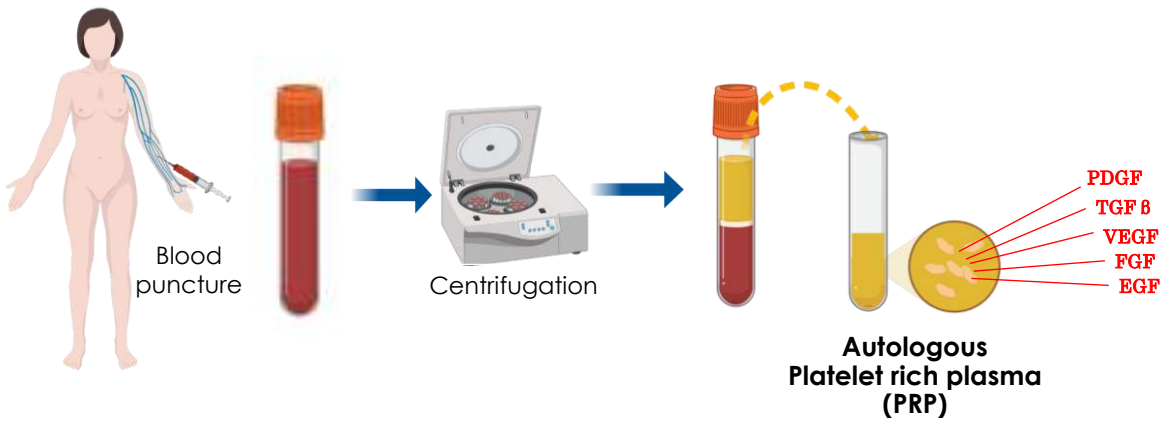
Platelet rich plasma (PRP)



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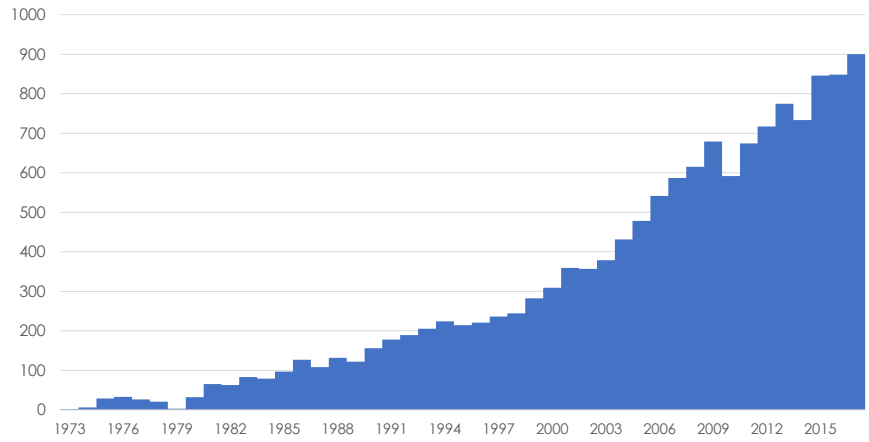
Platelet rich plasma (PRP)

Clinical application of PRP

PubMed

>14000 publications…. since ~1970



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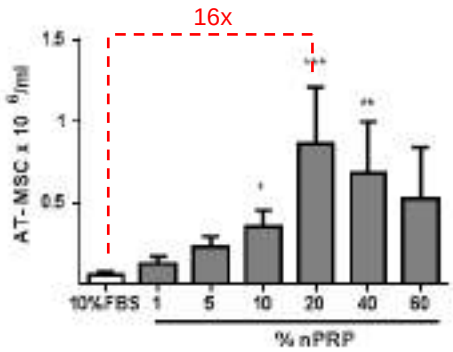
Platelet rich plasma (PRP)

PRP boosts adipose-derived stem cells culture



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Platelet rich plasma (PRP)

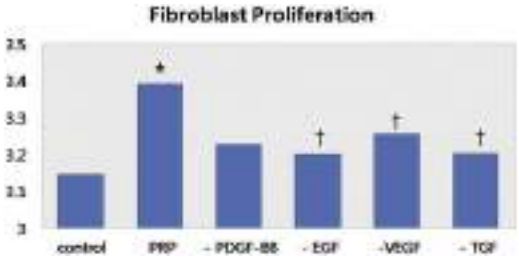
PRP increases fibroblast proliferation and collagen production: in vitro

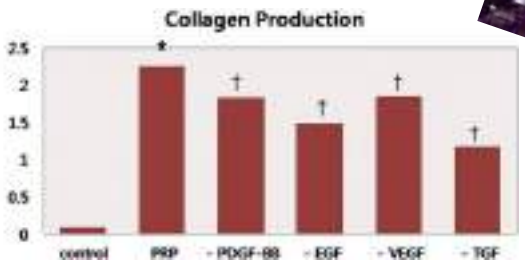
Tissue Engineering Part A, Ahead of Print |

Autologous Platelet-Rich Plasma (CuteCell PRP) Safely Boosts *In Vitro* Human Fibroblast Expansion

Sarah Berndt, Antoine Turzi, Brigitte Pittet-Cuénod, and Ali Modarressi

Published Online: 21 May 2019 | https://doi.org/10.1089/ten.tea.2018.0335





Cho et al. JPRAS, 2011

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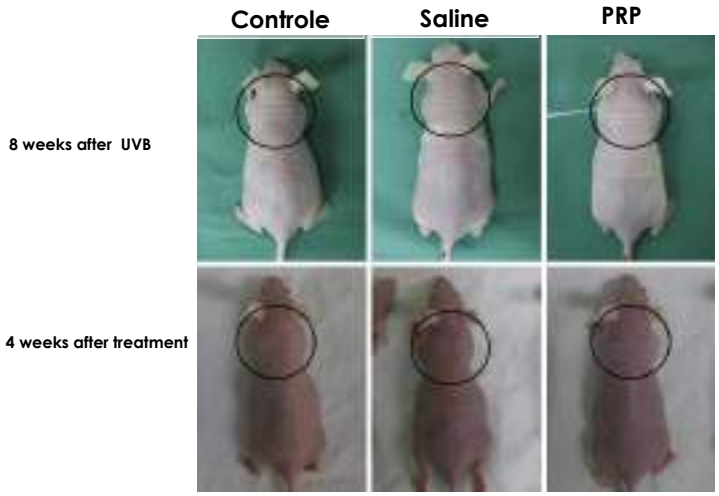
Platelet rich plasma (PRP)

PRP increases fibroblast proliferation and collagen production: in vivo



Cho et al. JPRAS, 2011

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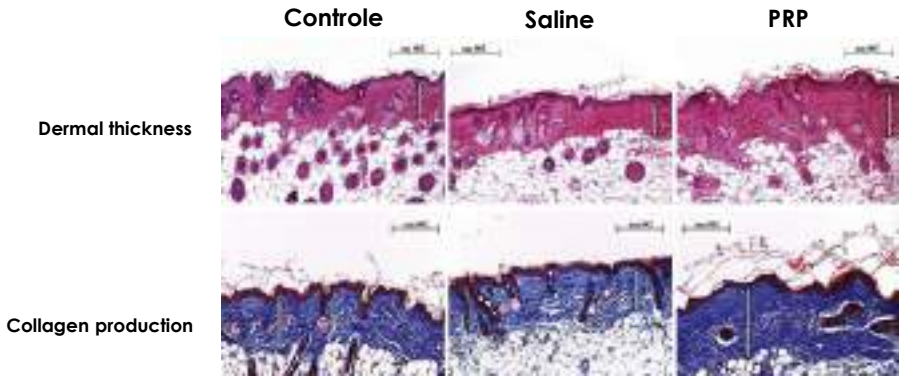
Platelet rich plasma (PRP)

PRP increases fibroblast proliferation and collagen production: in vivo



Cho et al. JPRAS, 2011

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Platelet rich plasma (PRP)

PRP increases dermis and collagen production: clinical experiment

PRP vs saline injection, and biopsy (n=20)

Collagen

+50%

Abuaf et al., Ann Dermatology, 2016

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Platelet rich plasma (PRP)

Skin rejuvenation, anti-wrinkle

Percent of Patients Who Declared a Particular Result and Method of Scoring PSO Improvement		
% of Patients	Result	Score
4.3	None	0
30.4	Mild	2
61	Good	4
4.3	Very good	6
4	Excellent	8

Abuaf et al., Ann Dermatology, 2016

Redaelli et al., J. Drug Derm 2010

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Platelet rich plasma (PRP)

Anti-melasma

- Patents satisfaction:
  - excellent: 30%
  - very good: 50%
  - good : 15%
  - none: 5%c

Cayirli et al., Ann Dermat, 2014

Suh & al., 2015

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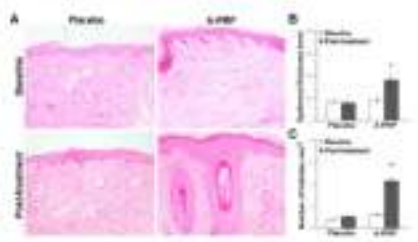
Platelet rich plasma (PRP)

Hair restoration



Gentile et al., Int. J. Mol. Sci. 2017

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Platelet rich plasma (PRP)

Regenerative filler:

90% PRP + 10% thrombin = PRP gel

6 months

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Conclusion

Regenerative medicine: Myth or reality in 2021?

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Conclusion

Regenerative medicine: Myth or reality in 2021?

Lipofilling
Safe
Simple
Give volume
Cost ~100 CHF

Stromal vascular fraction (SVF)
Safe
+/- Simple
No volume
Cost 500-3000 CHF

Nanofat
Safe
Fast
Simple
No volume
Cost ~100 CHF

PRP
Safe
Fast
Simple
No volume
Cost ~50 CHF

Stem cells
No autorization
2-3 weeks
Complex
No more efficient
Cost ~5000 CHF

Mesotherapy / Needeling ?

Laser ?

Filler ?

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Regenerative medicine

Tél.+41 78 876 31 31
Email: info@dr-Modarressi.ch
www.dr-Modarressi.ch

Avenue de Champel, 24
1206 Genève

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