

● 3<sup>rd</sup> generation needle-free injector

# NOVOJET



# INDEX

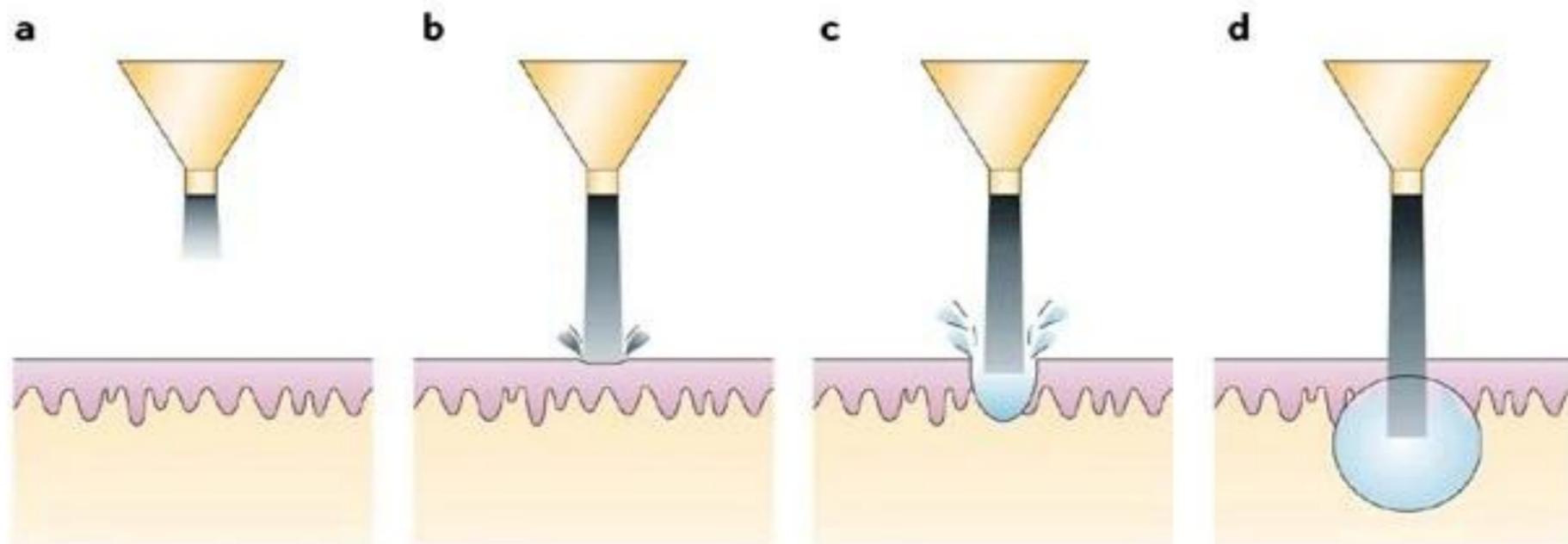
- 01 NFJI (Needle-free jet injector)
- 02 NOVOJET
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# 1) Intradermal injector

	Conventional		NFJI (NOVOJET)
	Syringe	Multi-needle injector	Needle-free jet injector
Concept	Drug delivery using needles 	Drug delivery using needles 	Drug delivery by high-velocity jet & micro-bomb effect 
Needle outer diameter	<ul style="list-style-type: none"> <li>• 34G - 0.1842 mm (184.2 <math>\mu\text{m}</math>)</li> <li>• 33G - 0.2096 mm (209.6 <math>\mu\text{m}</math>)</li> <li>• 32G - 0.2350 mm (235 <math>\mu\text{m}</math>)</li> </ul> <small>*source: Darwin microfluidics's syringe needle gauge</small>		<ul style="list-style-type: none"> <li>• 150,200,250 <math>\mu\text{m}</math></li> </ul>
Characteristic	<ul style="list-style-type: none"> <li>• Relatively inexpensive</li> <li>• Injection volume, depth, and procedure time (20+ minutes) vary depending on the practitioner</li> <li>• Issues with needle detachment or luer-lock adaptor rotation leading to drug leakage when injecting highly viscous hyaluronic acid (HA)</li> <li>• Needle phobia</li> </ul>	<ul style="list-style-type: none"> <li>• Requires less specialized skill from practitioners compared to needle syringes</li> <li>• Suction function</li> <li>• Needle phobia</li> <li>• Approximately 20 minutes for drug injection through multiple needles</li> </ul>	<ul style="list-style-type: none"> <li>• Requires less specialized skill from practitioners compared to needle injections</li> <li>• Consistent drug injection volume and depth control</li> <li>• Smaller nozzle hole size than the outer gauge of a needle, allowing for more precise delivery from the skin surface.</li> <li>• Low pain for scar Tx</li> <li>• Rapid drug administration (at high frequency)</li> </ul>

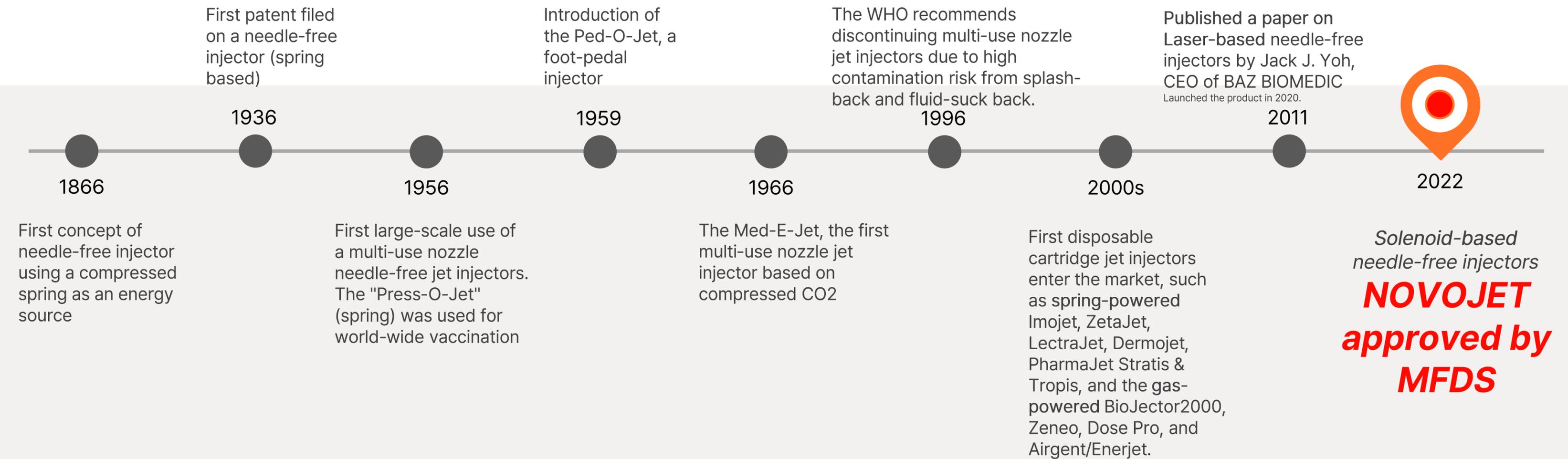
## 2) What is NFJI (Needle-free jet injector)

*Schematic depiction of the jet injection process.<sup>1)</sup>*

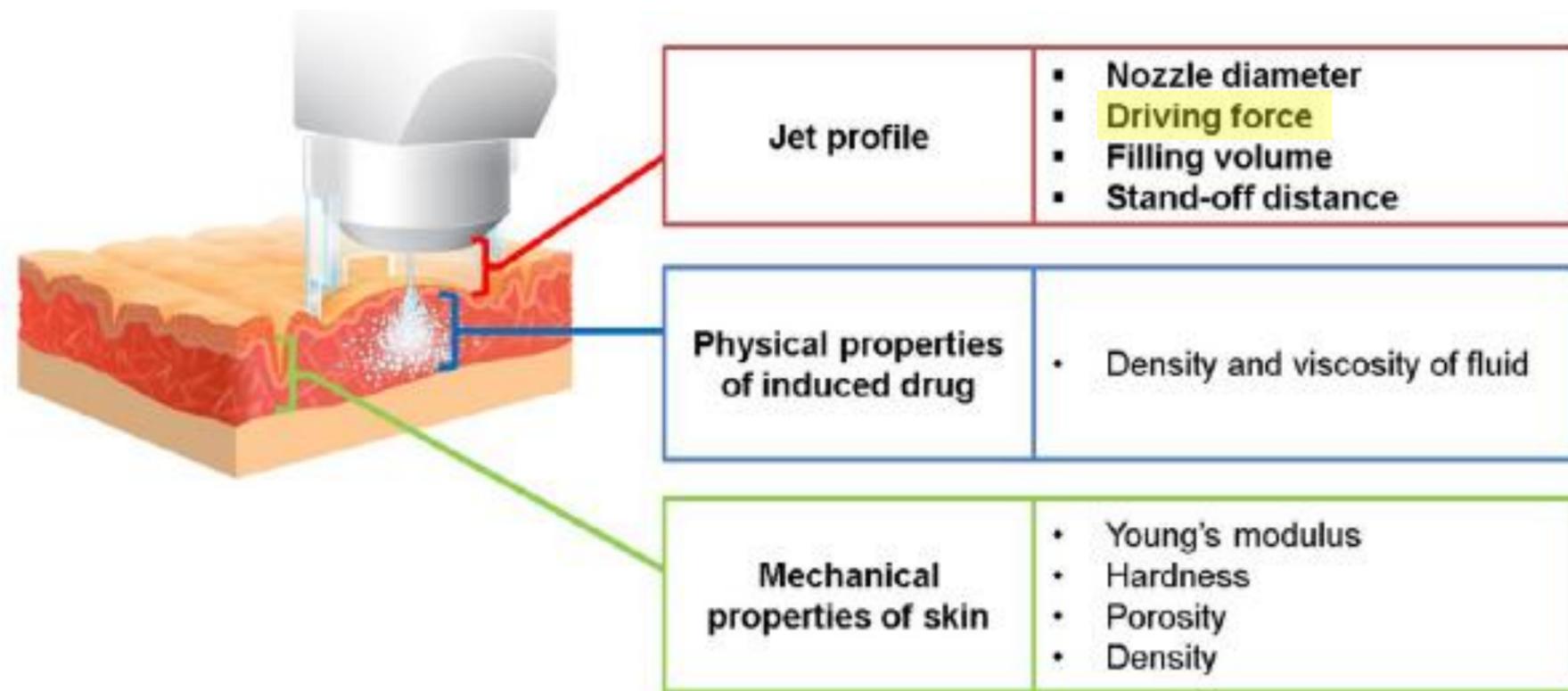


- Uses a high-velocity jet to puncture the skin and delivers drugs to the necessary depth without the use of needle<sup>2)</sup> for various skin remodeling treatment

# 3) NFJI (Needle-free jet injector) History

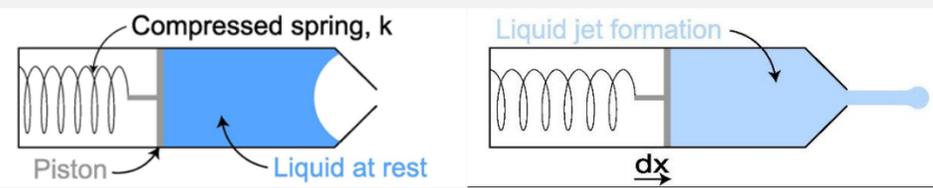
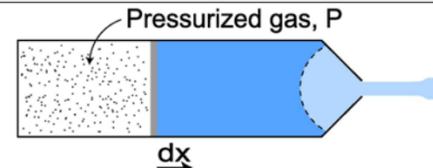
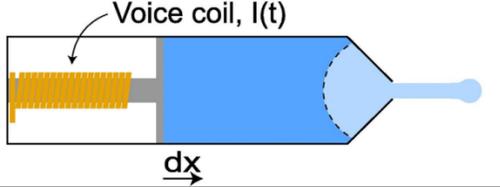


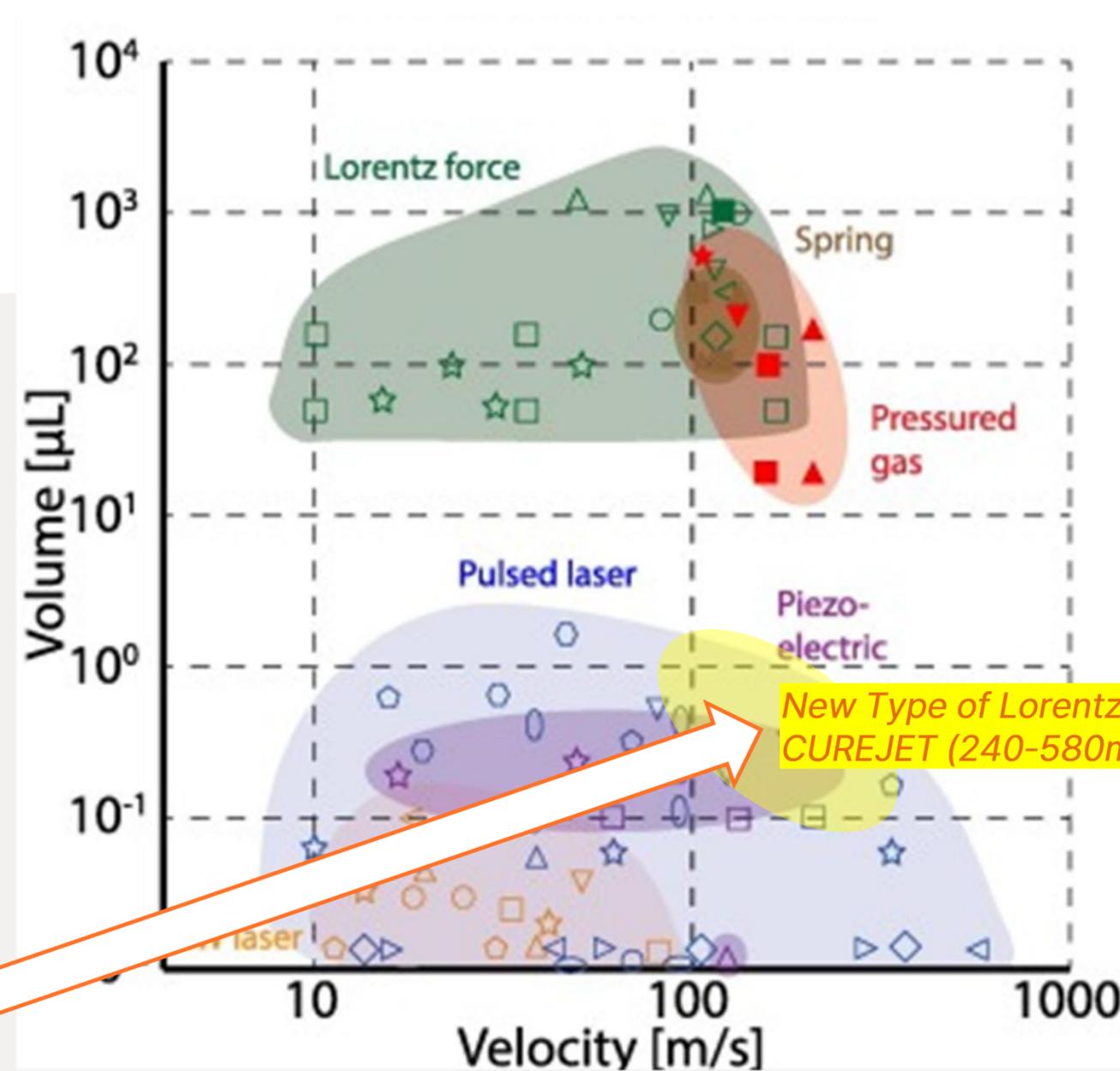
## 4) Characteristics of NFJI (Needle-free jet injector)



- Conventional NFJI: composed of three key constituents: an injection chamber to hold the drug, and pressure source that produce high-velocity jets.
- Jet injection outcomes can be described by changes in the skin surface, penetration depth, and dispersion shape created by the jet inside the skin. In particular, the dispersion pattern and penetration depth greatly affects drug absorption and injection associated pain.
- **The jet profile is the most important and modifiable factor that determine the characteristics of jet penetration through the skin.**

# 4) Characteristics of NFJI (Needle-free jet injector)

Driving force (Energy source)	Technique
Mechanical	Spring: Dermo###, Pharma### 
	Compressed gas: Air#### 
Optical	Pulsed laser: Mira### 
Electromechanical	<b>Lorentz force: NOVOJET</b> 



# 4) Characteristics of NFJI (Needle-free jet injector)

Model	DERMOJET	Enerjet	MIRAJET	NOVOJET
Image				
Launching year	1959 (application for patent)	2009 (510k)	2020 (MFDS)	2022 (MFDS)
Driving force (Energy source)	Spring-loaded	Compressed gas	Pulsed Er:YAG Laser (Lotus III/Laseroptek)	Solenoid-Electro Technology
Dimension (mm)	300 × 200 × 200 / 2kg	400(W)*400(D)*1150(H) / 30kg *HP: 213 x 226 x 98 / 1.1kg	330(W)*942(L)*906(H) / 100kg	400(W)*300(D)*900(H) / 30kg
Repetition rate (Hz)	N/A	N/A	10-40Hz	1-20Hz
Jet diameter	200 um	200 um	150,200,250 um	150,200,250 um
Consumable nozzle	N/A <small>*An overhaul must be performed after it has been used 4,000 times, or every 18 months.</small>	Single use	Single use	Single use
Injected drug volume/ shot	0.1- mL	0.05 to 0.15 mL	≈0.0003mL	≈0.0002-0.0015mL
Penetration depth	Not specified (Intradermal~)	Upto 6mm	0.1~2.0 mm	0.1-2.5 / 5.00mm

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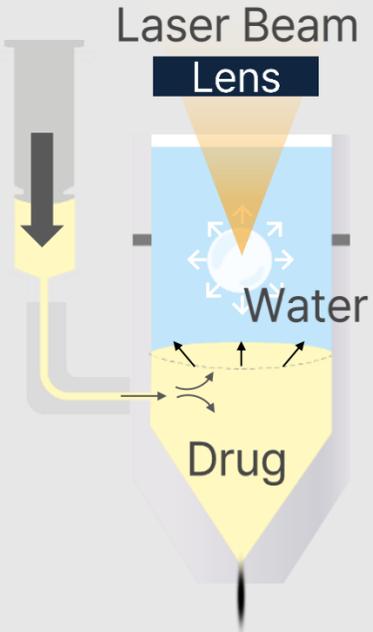
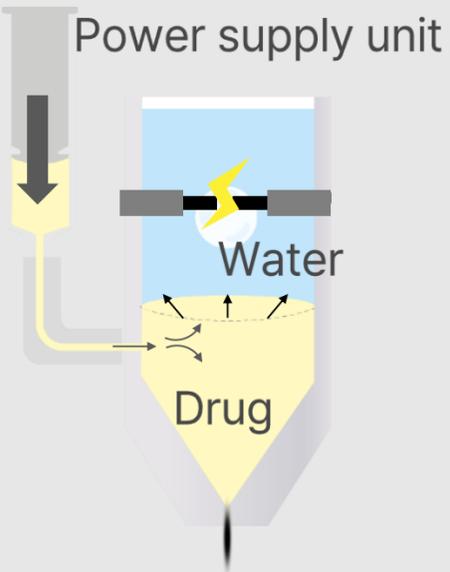
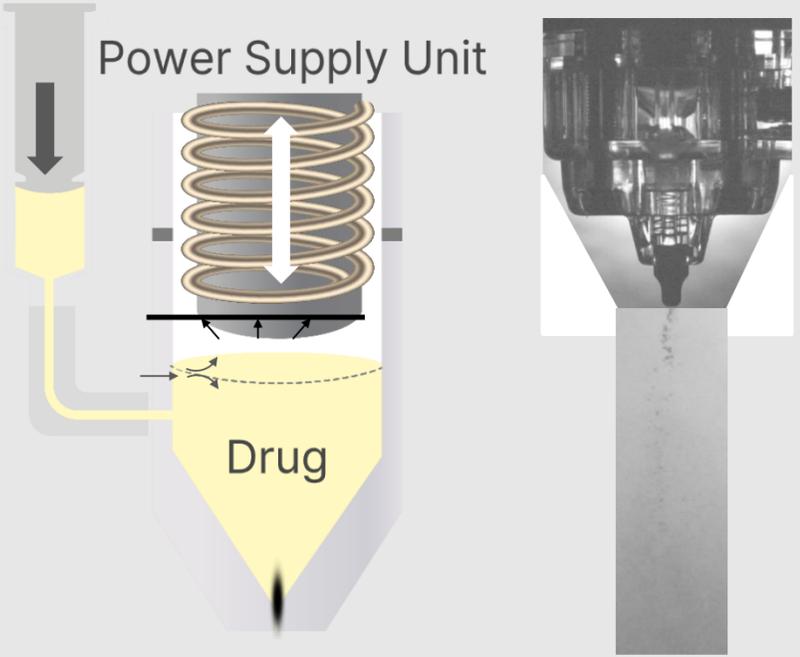
- 01 NFJI (Needle-free jet injector)

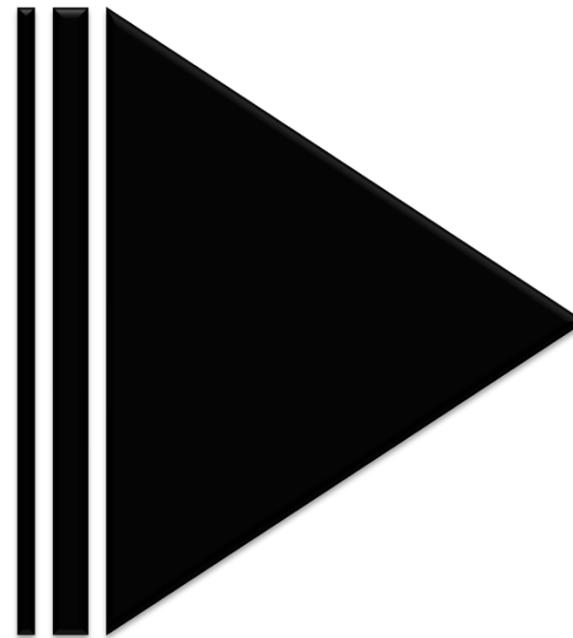
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- 02** NOVOJET

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- 03 Before & After

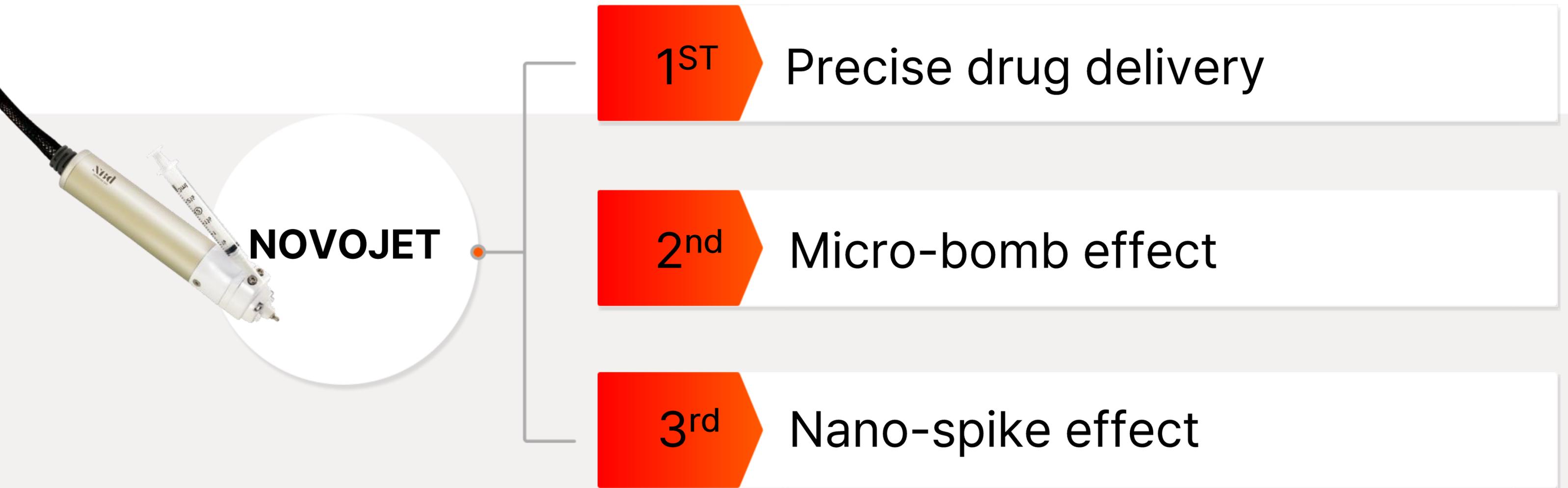
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# 1) The 3<sup>rd</sup> generation of NFJI: *Patented original technology*

1st Generation	2nd Generation	3rd Generation
LASER	Electric Spark	Solenoid-Electro Technology
		
<ul style="list-style-type: none"> <li>• Confirmed feasibility of injection using repetitive (Hz) and bubble methods</li> <li>• Due to the high cost of the energy source, increased price</li> <li>• Expensive consumables</li> </ul>	<ul style="list-style-type: none"> <li>• Simplified energy source</li> <li>• Research on product miniaturization</li> <li>• Limitation of consumable prices</li> </ul>	<ul style="list-style-type: none"> <li>• Utilizing repetitive (Hz) and new energy sources</li> <li>• <b>Enhanced precise performance and injection depth</b> compared to bubble methods</li> <li>• Product <b>miniaturization</b> achieved</li> <li>• <b>Reduced consumable costs</b></li> </ul>



# 1) The 3<sup>rd</sup> generation of NFJI



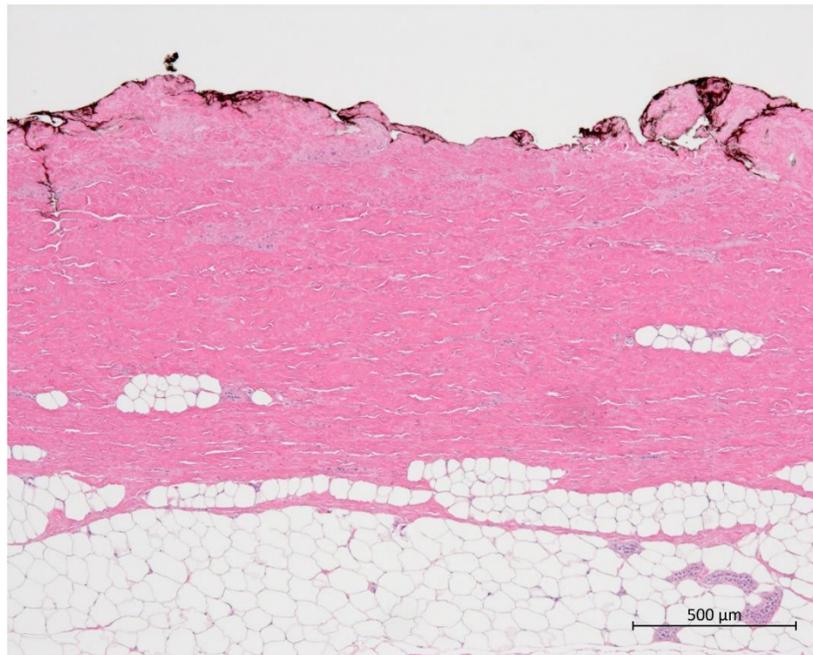
# 1) The 3<sup>rd</sup> generation of NFJI

## Histological changes

Porcine sample: Micropig abdomen section used as a Franz cell membrane, stained with H&E and injected with ink

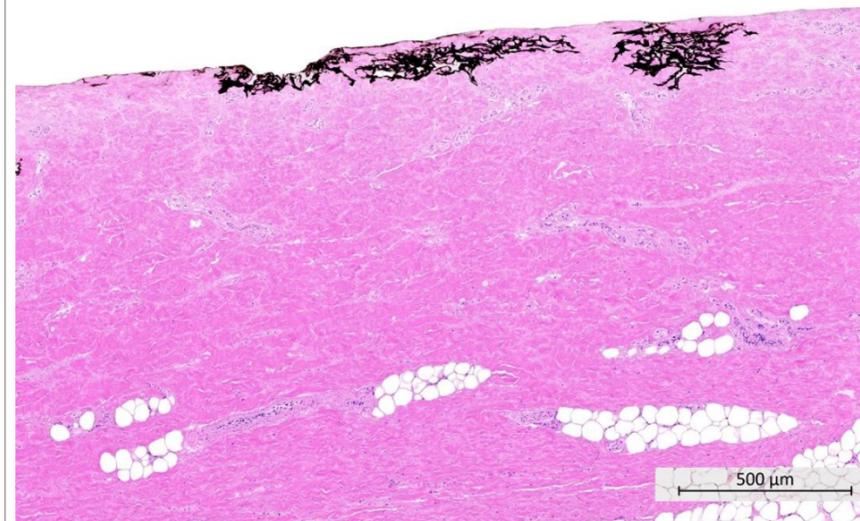
MTS (stamp type – 2mm needle depth)

Limited to the uppermost epidermal layer



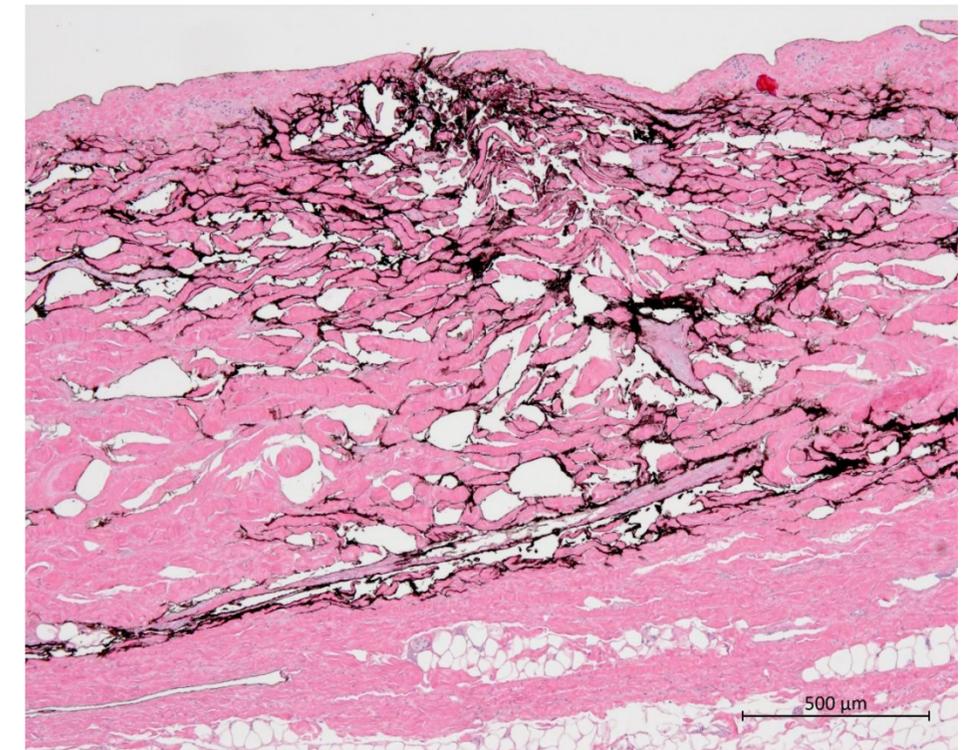
NOVOJET – Distant shot

Achieves precise penetration into the upper dermis



NOVOJET – Contact shot

Ensures micro-bomb to the dermis



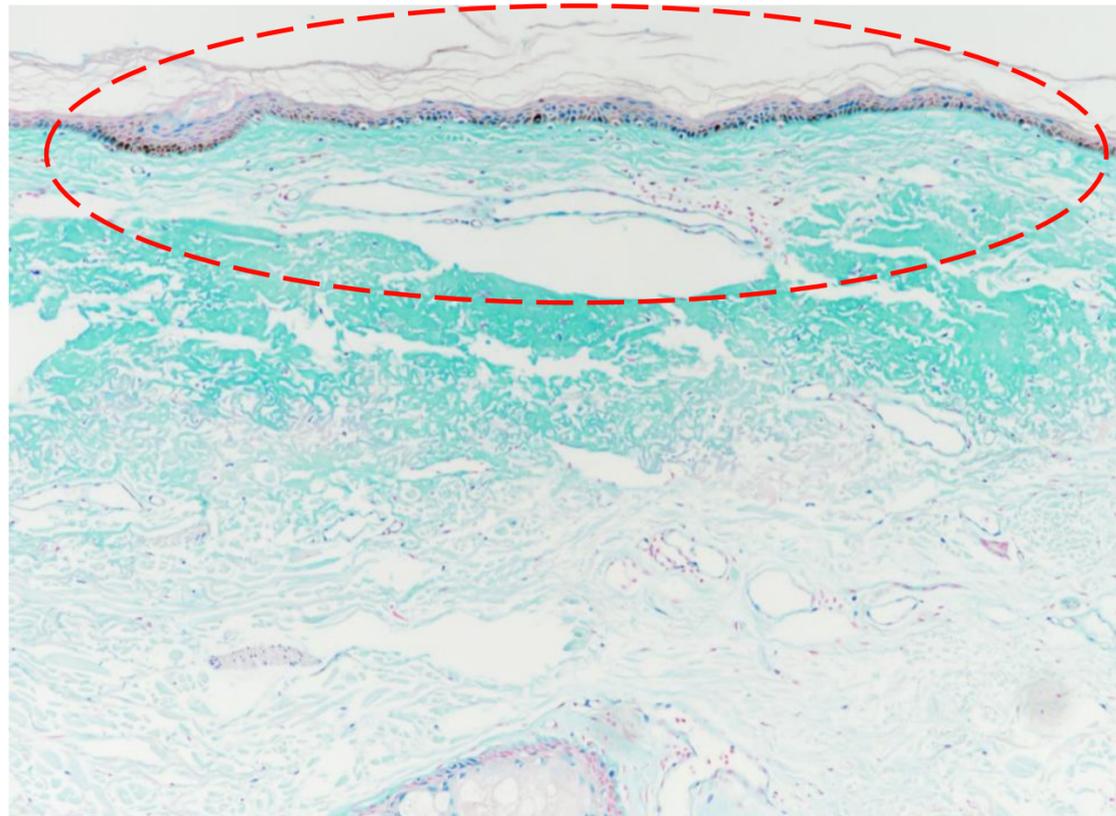
# 1) The 3<sup>rd</sup> generation of NFJI

## Cadaveric test

Nano-spike effect

Target: Upto papillary dermis

Face, 15mm distant shot, Diluted PDLLA, using Alcian Blue Stain x 100<sup>1)</sup>

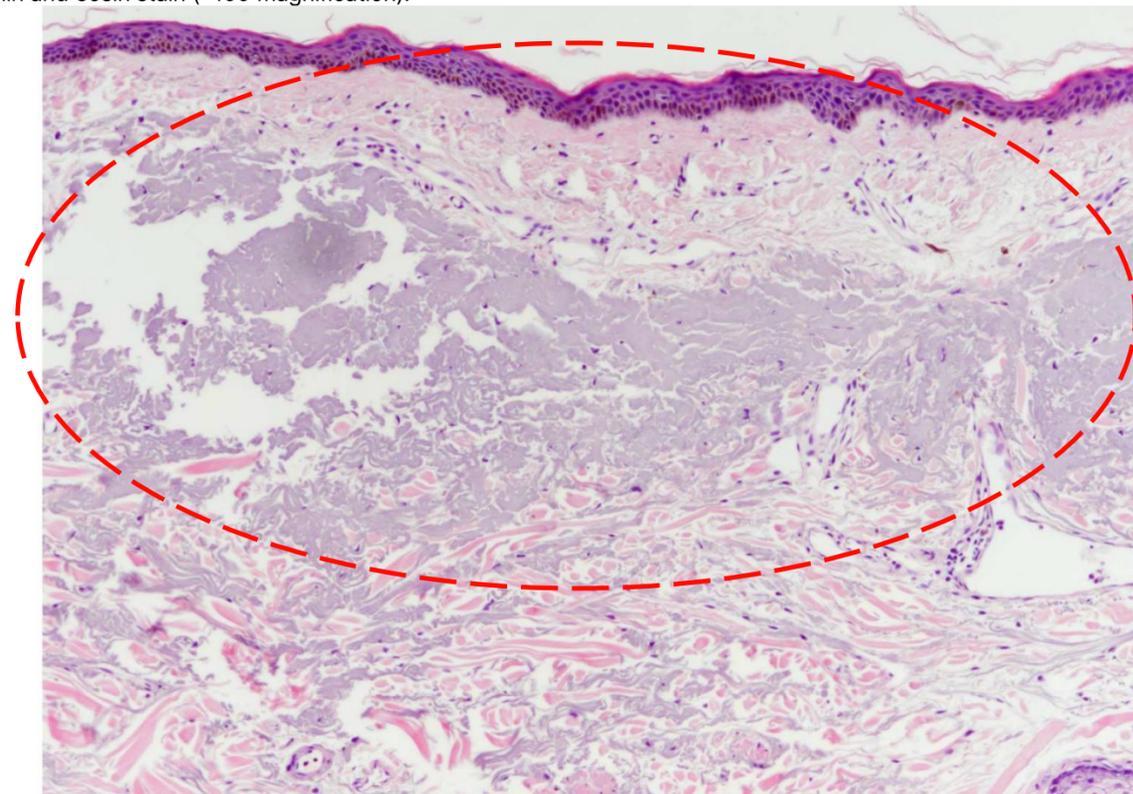


Micro-bomb effect

Target: Upto reticular dermis

Face, 5mm contact shot, Diluted PDLLA, using H&E stain x100<sup>2)</sup>

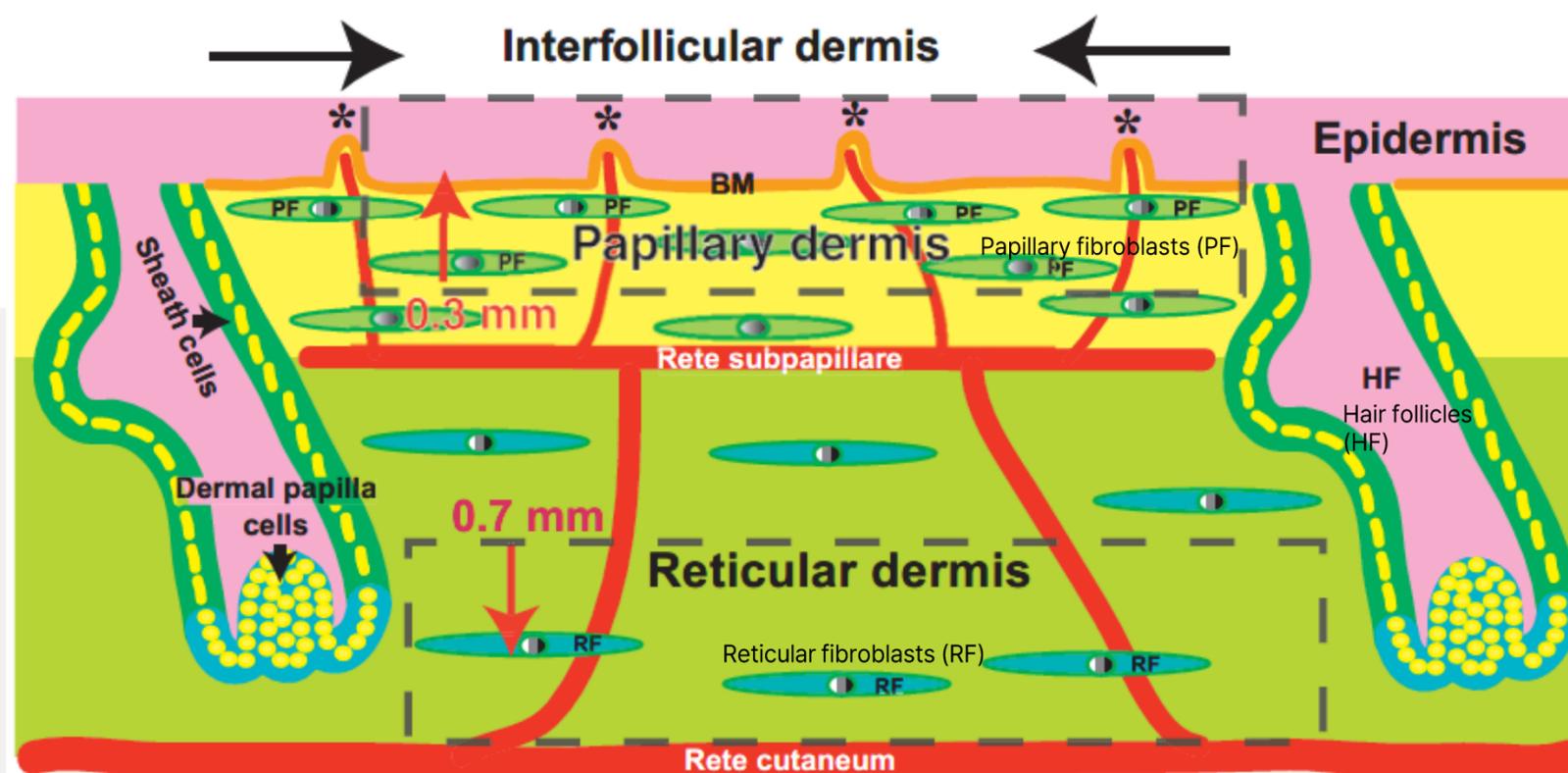
- revealing a uniform distribution of poly-(lactic acid) particles in the dermis. These particles were primarily located in the upper- and mid-dermis, with a presence also in the lower dermis. The epidermal layer and blood vessels appear to be undisturbed. Hematoxylin and eosin stain (x100 magnification).



Source 1) Courtesy of BAZ BIOMEDIC

Source 2) Needle-Free Jet Injection of Poly-(Lactic Acid) for Atrophic Acne Scars: Literature Review and Report of Clinical Cases (2024)

# 2) Mechanism of action



• Targeting both 0.3 mm (Papillary dermis) and 0.7 mm (Reticular dermis) depths to activate dermal fibroblasts and enhance basement membranes (BM) with collagen I and III can be expected to result in overall skin rejuvenation.

- - Dermal fibroblasts are essential component of skin; they not only produce and organize the extracellular matrix of the dermis but they also communicate with each other and other cell types, playing a crucial role in regulating skin physiology.

- Basement membranes (BMs) are highly specialized extracellular matrices (sECMs) forming thin acellular layers that underlie cells and separate the cells from and connect them to their interstitial matrix [5]. The formation of BMs is a prerequisite for normal tissue development and function. Adult tissues need a highly selective sECM to maintain their stem cell properties particularly in stem cells during development

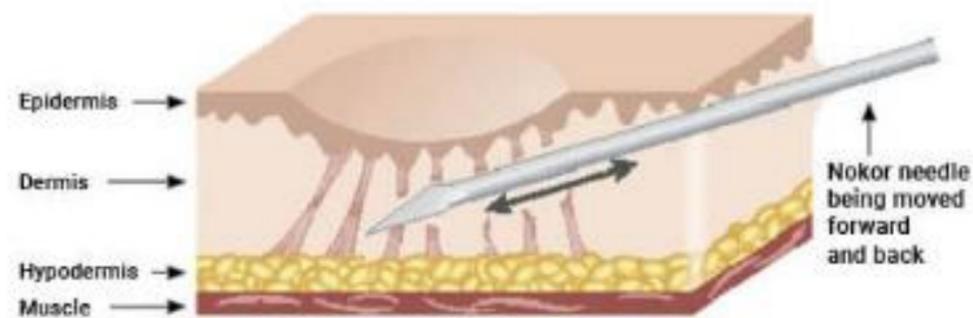
Table 1. Distribution of selected extracellular matrix molecules in dermal compartments

Matrix component	Papillary dermis	Reticular dermis	Hair follicle
Collagens I and III	High ratio of type III to I	Low ratio of type III to I	Present
Collagen IV	Present in basement membrane	Absent	Present in dermal papillae
Collagen VI	Present at dermal-epidermal junction (DEJ)	Weakly present	Present in dermal sheaths
Collagen XII	Present	Low to absent	High expression around follicular sheath
Collagen XIV	Low to absent	Present	Low expression
Collagen XVI	Present in DEJ-region	Absent	Unknown
Tenascin-C	Present in DEJ-region	Absent	Present in sheaths and dermal papillae
Tenascin-X	Weak in DEJ-region	Present	Not associated
Versican	Diffuse in DEJ-region, present in matrix fibrils	Present in association with elastic fibers	Present in dermal papillae
Decorin	Present	Present	Unknown

## 2) Mechanism of action – Conventional scar Tx.

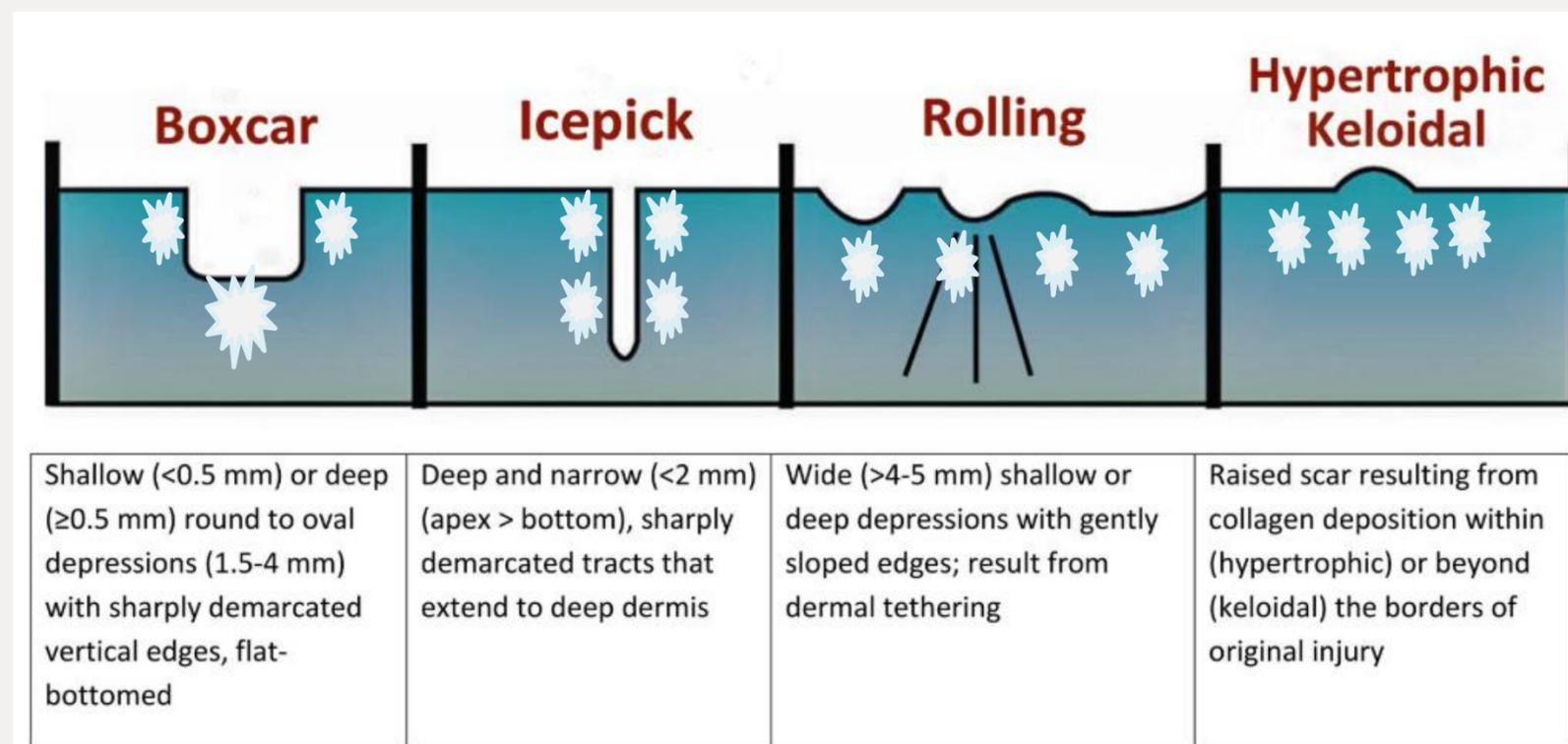
Scar Type	Presentation	Treatment Options
Ice pick	Narrow (<2 mm) at the surface and tapers as they extend to deep dermis Extend vertically into the deep dermis or subcutaneous tissue	Punch excision Chemical reconstruction of skin scars (CROSS) using trichloroacetic acid (TCA) Laser resurfacing Radiofrequency Platelet-rich plasma
Rolling	Dermal tethering of abnormal fibrous bands which produces a dell in the skin Scars are 4-5 mm wide that are sloped with shallow borders	Subcision Injectable fillers Non-ablative laser Microdermabrasion Microneedling Platelet-rich plasma
Boxcar	Broad, round-to-oval or rectangular depressions, usually box-like depressions with sharply defined edges	Resurfacing laser Punch excision Punch elevation Microdermabrasion Chemical peeling Injectable fillers Non-ablative lasers Platelet-rich plasma
Hypertrophic	Pink raised lesions that persist within the borders of the original site of injury	Intralesional corticosteroid injections Vascular laser (e.g., pulsed dye) Intralesional 5-fluorouracil (5-FU) Laser resurfacing Cryotherapy Imiquimod cream
Keloids	Reddish-purple scars that frequently extend beyond the borders of the original site of injury	Intralesional corticosteroid injections Intralesional 5-FU Intralesional interferon Intralesional bleomycin Imiquimod cream Laser resurfacing

# 2) Mechanism of action – Scar and striae distensae



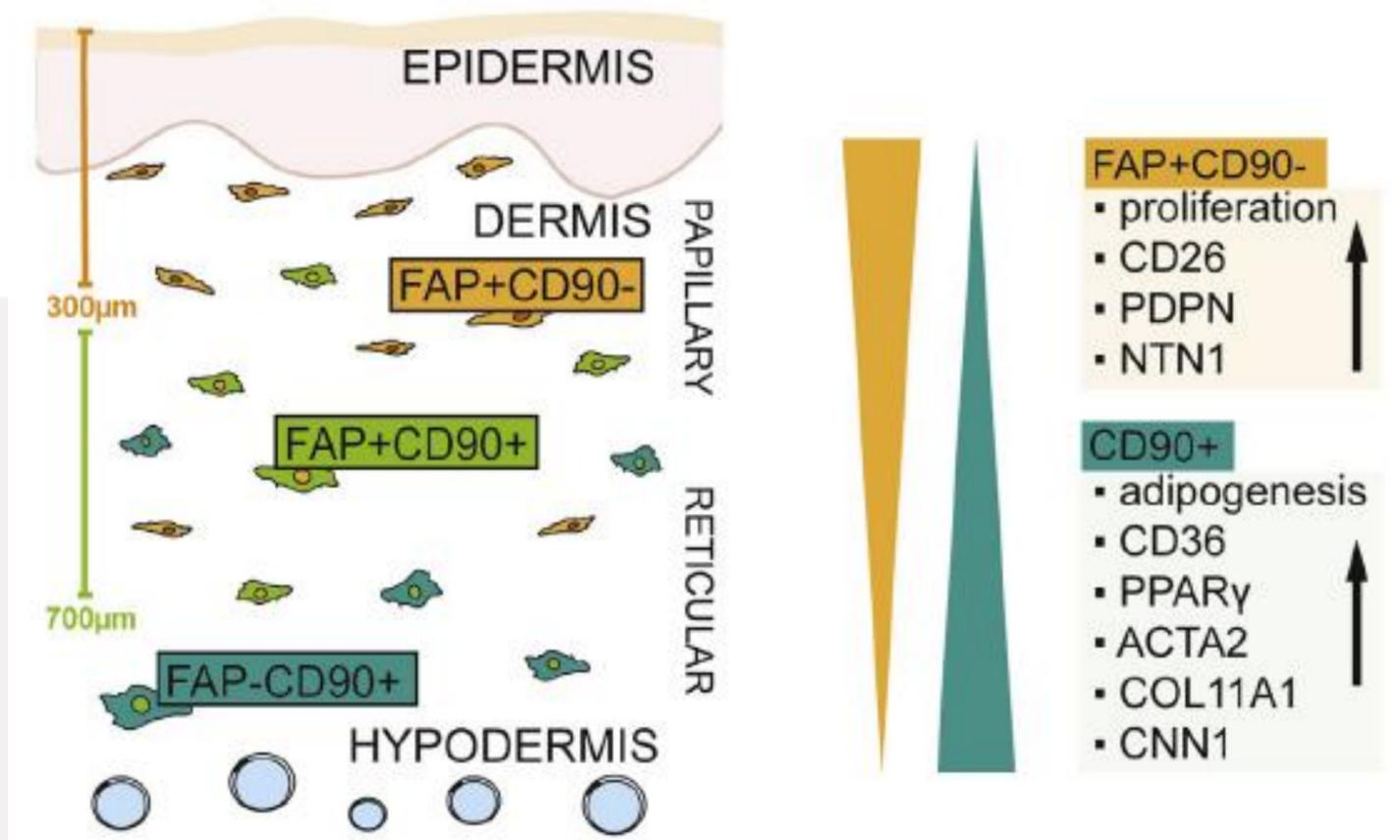
The mechanism of conventional pinhole and/or subcision techniques involves releasing fibrotic strands underlying scars, organizing blood in the induced dermal pocket, and forming connective tissue in the area. However, these methods result in longer downtime and a high level of patient discomfort, and they need to be performed twice, 2-3 months apart.

- NOVOJET offers a more moderate pain level and incorporates mechanical micro-subcision effects with shorter treatment intervals.



Source-based reediting) Acne Scarring Management: Systematic Review and Evaluation of the Evidence (2018)

## 2) Mechanism of action – Rejuvenation

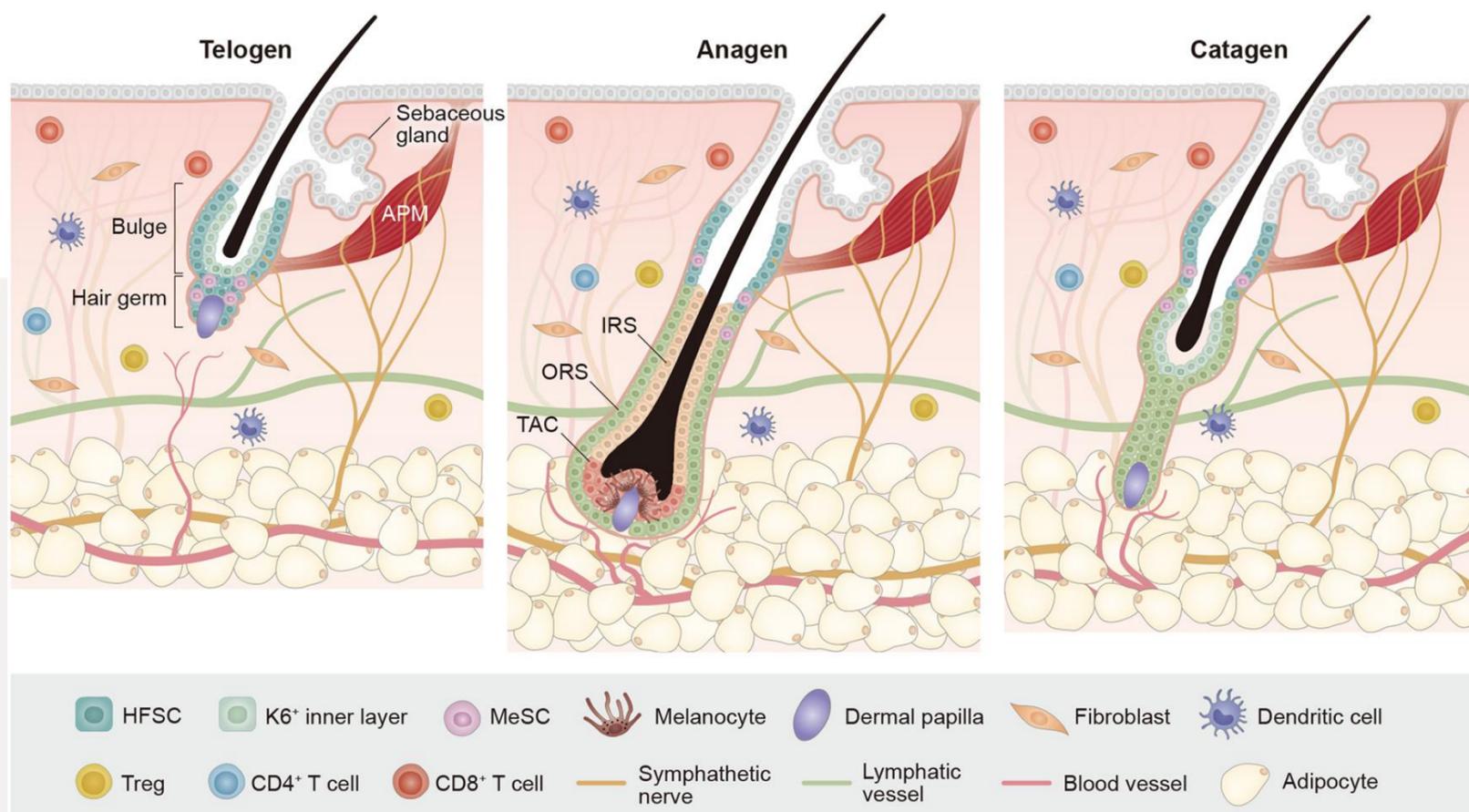


The study by Korosec et al. (2019) highlights the distinct roles of papillary and reticular fibroblasts in the dermis.

To achieve effective skin rejuvenation, it is crucial to stimulate both the papillary fibroblasts, which are involved in proliferation and structural maintenance, and the reticular fibroblasts, which contribute to adipogenesis and matrix remodeling.

This dual-targeted approach can enhance overall skin rejuvenation by promoting collagen production and reducing signs of aging.

# 2) Mechanism of action – Hair growth stimulation



The hair follicle (HF) regeneration process involves the anagen, catagen, and telogen phases, which are closely regulated by signaling pathways such as BMP, Wnt, FGF, and JAK/STAT. These pathways influence stem cell quiescence, activation, and hair growth. The Wnt/ $\beta$ -catenin pathway, in particular, is crucial for promoting HF stem cell activation and hair growth.<sup>1)</sup>

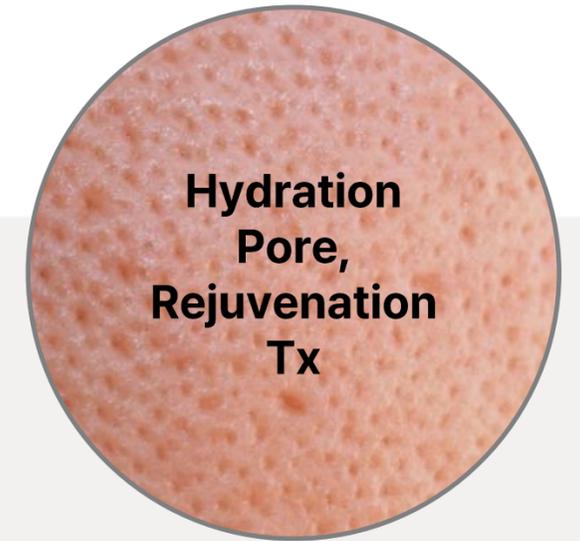
During hair growth, dermal papilla (DP) cells secrete various paracrine factors to induce migration of stem cells from the bulge region of the outer root sheath (ORS) to the upper region of the follicle, and the migrated cells become transit amplifying cells, which then undergo differentiation into matrix cells.<sup>2)</sup>

This process of cell migration and differentiation is essential for promoting the regeneration cycle of hair follicles and maintaining hair growth.

Therefore, it is crucial to stimulate the dermis and deliver active ingredients to support hair growth.

Hair follicle stem cells can generate various cell types within the HF. The immune system, including T cells, macrophages, dendritic cells, and Treg cells, undergoes fluctuations during the hair growth cycle and plays an important role in HF regeneration. Blood vessels play a crucial role in HF regeneration by providing oxygen, nutrients, and growth factors essential for hair growth and maintenance. The surrounding vasculature enables the delivery of these vital components. The interactions among lymphatic vessels, sympathetic nerves, sensory nerves, and HFs are complex and interconnected, collectively contributing to HF function regulation, including nutrient supply, immune surveillance, and responses to environmental cues.<sup>1)</sup>

### 3) Indication



- Based on the indication, **NOVOJET can provide precise penetration depth for drug delivery and mechanical micro-bomb effects from the epidermis to the dermis.**
- It offers a more moderate pain level and shorter treatment intervals compared to conventional treatments.

# 4) Solutions

Composition	Solution	Particle size	Recommended Diluent Volume per Vial
PDLLA	Lenisna (Juvelook volume 200mg)	60-80 $\mu$ m	24~40cc
PDLLA	Juvelook 50mg	30-40 $\mu$ m	16~cc
Botulinum Toxin	Botox 100unit	150 kDa	Ready to use

Composition	Solution	Particle size	Recommended Diluent Volume per Vial
Exosome	EXOSOME	150 nm	Ready to use *Remark: for the 1,2 mix type, dilution may be required
Non-crossed linked HA	High Inj 2ml	50-100 $\mu$ m	4cc
PN	Rejuran 2ml	1000 kDa	4cc

Recommended diluent volume per vial may vary depending on the indication and the operator's preference.

# 4) Solutions – Hair

Composition	Solution	Particle size	Recommended Diluent Volume per Vial
Botulinum Toxin	Botox 100unit	150 kDa	Ready to use
Exosome	EXOSOME	150 nm	Ready to use *Remark: for the 1,2 mix type, dilution may be required
PRP	-	-	-

Composition	Solution	Particle size	Recommended Diluent Volume per Vial
Minoxidil 2%	-	-	*Dilute to a concentration of 2% or less *Ensure that the total daily dosage, based on the undiluted solution, does not exceed 2 mL (MFDS guideline)
Mixed *G4PRF-300	Reclock		
Mixed *Caffein, Nacinamide, Zinc PCA	Reclock Scalp		

# 4) Solutions & Parameter – Courtesy of Jimin Lee (M.D.)

Major Indications	Acne scar	Neck Wrinkles	Striae distensae	Rejuvenation /Skin Texture
Parameter	Power: 1~4 (Pro mode: Lv. 1, 5, 8, 11, 13) Speed : 10Hz Mode : Auto Volume 2~6  + Rejuvenation mode	Power: 1~2 (Pro mode: Lv. 1, 5) Speed : 10Hz Mode : Auto Volume 2~6  + Rejuvenation mode	Power: 1~3 (Pro mode: Lv. 1, 5, 8, 11) Speed : 10~15Hz Mode : Auto Volume 2~6	Power: 1 (Pro mode: Lv. 1) Speed : 10~20Hz Mode : Auto Volume 2~6
Tip-Skin Contact	Contact +Non-Contact	Contact +Non-Contact	Contact	Non-Contact
Types of Injectables	PDLLA(Juvelook, Juvelook Vol), PLLA	PDLLA(Juvelook, Juvelook Vol), PLLA	PDLLA, PLLA	PDLLA, PLLA PDRN, Toxin
Combination treatment	Needle RF	Monopolar/Needle RF		HIFU, Monopolar/Needle RF
Dilution Method	Juvelook (10~15:1) Juvelook volume(25~30:1)	Juvelook (10~15:1)	Juvelook volume(25~30:1)	Juvelook (10~15:1)

# 5) Clinical paper

Published on acne scar treatment using contact procedure (micro-BOMB)

Needle-Free Jet Injection of Poly-(Lactic Acid) for Atrophic Acne Scars: Literature Review and Report of Clinical Cases (J. Clin. Med. 2024)

Journal of Clinical Medicine

MDPI

Review

## Needle-Free Jet Injection of Poly-(Lactic Acid) for Atrophic Acne Scars: Literature Review and Report of Clinical Cases

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**Abstract:** Acne scars, particularly atrophic ones, present a persistent challenge in cosmetic medicine and surgery, requiring extended and multifaceted treatment approaches. Poly-(lactic acid) injectable fillers show promise in managing atrophic acne scars by stimulating collagen synthesis. However, the utilization of needle-free injectors for delivering poly-(lactic acid) into scars remains an area requiring further exploration. In this article, a summary of the latest advancements in needle-free jet injectors is provided, specifically highlighting the variations in jet-producing mechanisms. This summary emphasizes the differences in how these mechanisms operate, offering insights into the evolving technology behind needle-free injection systems. The literature review revealed documented cases focusing on treating atrophic acne scars using intradermal poly-(lactic acid) injections. The results of these clinical studies could be supported by separate in vitro and animal studies, elucidating the feasible pathways through which this treatment operates. However, there is limited information on the use of needle-free jet injectors for the intradermal delivery of poly-(lactic acid). Clinical cases of atrophic acne scar treatment are presented to explore this novel treatment concept, the needle-free delivery of poly-(lactic acid) using a jet pressure-based injector. The treatment demonstrated efficacy with minimal adverse effects, suggesting its potential for scar treatment. The clinical efficacy was supported by histological evidence obtained from cadaver skin, demonstrating an even distribution of injected particles in all layers of the dermis. In conclusion, we suggest that novel needle-free injectors offer advantages in precision and reduce patient discomfort, contributing to scar improvement and skin rejuvenation. Further comprehensive studies are warranted to substantiate these findings and ascertain the efficacy of this approach in scar treatment on a larger scale.

**Keywords:** acne scars; atrophic scars; drug-delivery systems; needle-free injectors; poly-(lactic acid); poly-(D,L-lactic acid); poly-(L-lactic acid)

**1. Introduction**

Clinical treatments for atrophic acne scars encompass punch excision, subcision, dermabrasion, chemical peeling, fractional lasers and radiofrequency, and injectable fillers [1]. Among the various materials available for injectable fillers, poly-(lactic acid) (PLA) has been examined for the treatment of atrophic acne scars and was found to be a favorable choice for correcting macular atrophic scarring in individuals with thin dermal tissue. PLA injection is particularly noteworthy compared to other commonly used injectable hyaluronic acid (HA) fillers for treating atrophic acne scars [2]. However, there is a scarcity of reports detailing the treatment of atrophic acne scars through the intradermal delivery of PLA without relying on conventional sharp needles. This article provides an overview of the mechanism by which PLA improves depressed scars, particularly atrophic acne scars. It also examines the recent advancements in needle-free jet injectors and their application in delivering PLA to acne scar lesions. To affirm its feasibility, the article presents clinical cases

check for updates

Citation: Rho, N.-K.; Kim, H.-J.; Kim, H.-S.; Lee, W. Needle-Free Jet Injection of Poly-(Lactic Acid) for Atrophic Acne Scars: Literature Review and Report of Clinical Cases. *J. Clin. Med.* **2024**, *13*, 440. <https://doi.org/10.3390/jcm13020440>

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*J. Clin. Med.* **2024**, *13*, 440. <https://doi.org/10.3390/jcm13020440> <https://www.mdpi.com/journal/jcm>

### 4.2. Needle-Free Injection System

The needle-free injecting system (CUREJET; Baz Biomedic, Seoul, Republic of Korea) operates based on the following principle: an electric current applied to the actuator coil generates an electromagnetic force that propels the piston forward. When the piston contacts the membrane, the momentum is transferred to the liquid in the drug chamber, dispersing it from the nozzle onto the target area (Figure 2). Following the Venturi effect, the fluid propelled through the nozzle attains a very high speed, creating a microjet. Using Curejet, this process can be repeated at rates of up to 20 Hz.



- 1) Session: a single session
- 2) Injectable: a fibroblast-stimulating agent, a commercial PLA lyophilized powder (JUVELOOK; Vaim, Seoul, Republic of Korea) was employed, where one vial containing 42.5 mg of PDLLA and 7.5 mg of non-cross-linked HA was diluted with 8 mL of physiologic saline and vortexed for 2 h before administration.
- 3) Tx area: cheeks
- 4) Parameter
  - (1) 150 μm nozzle diameter,
  - (2) 3 Hz, energy level of 5 (equivalent to 200 volts)
  - (3) Placing the nozzle at a 5 mm gap over the depressed scar area, the PLA suspension was injected into the dermis and subcutaneous fat through microjet injections.
  - (4) A minute volume of 1.5 microliters was administered for each shot.
  - (5) Two or three consecutive injections were administered to each atrophic scar lesion, delivering 1.5–2 mL of the product to each cheek

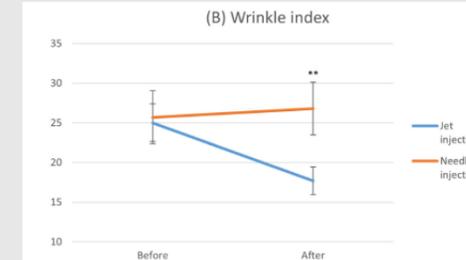
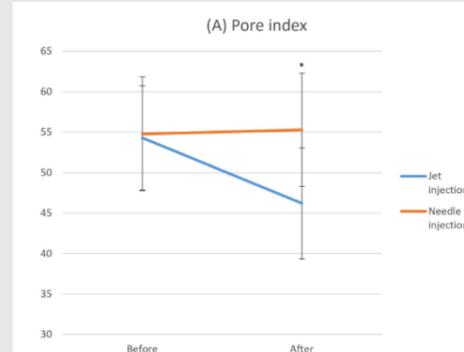
## Published on skin rejuvenation using contact procedure

### Therapeutic Performance of Needle Injection Versus Needle-Free Jet Injector (J of Cosmetic Dermatology. 2024)

- 1) Session: a single session
- 2) Injectable: Purified polynucleotide (PN), Rejuran (Pharma research Product, Inc., Seoul, Republic of Korea)
- 3) Tx area: Face
- 4) Parameter
  - (1) 200  $\mu$ m nozzle diameter,
  - (2) Power 5 $\rightarrow$ 2, Speed 10 $\rightarrow$ 5 Hz, Volume 5
  - (3) Split face treatment
    - Each side of the face received 2.0mL of filler, with 1.0 mL administered per side.
    - Intradermal injections utilized a 33-gauge nano-needle. The injections were spaced about 1cm apart.

### 2.3 | Devices

This study utilized the CureJet, a needle-free, low-pressure jet injector with adjustable volume and pressure settings. The device operates by generating an electro-magnetic field via a coil, which propels fluid into the skin. It offers three modes of op-



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ORIGINAL ARTICLE OPEN ACCESS

#### Therapeutic Performance of Needle Injection Versus Needle-Free Jet Injector System for Polynucleotide Filler in Skin Rejuvenation

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Keywords: needle-free jet system | polynucleotide | pore | rejuvenation | wrinkle

#### ABSTRACT

**Background:** Polynucleotide (PN) filler often causes pain and can lead to delivery inaccuracies when applied via intradermal injection using a traditional needle.

**Aims:** To evaluate the efficacy of treatment and the pain during the procedure using conventional needle injection versus a needle-free jet system for intradermal PN filler application.

**Methods:** In this split-face clinical trial, 10 Korean subjects were enrolled. Each subject received an intradermal injection of PN filler on one side of the face and a needle-free jet injection using CureJet on the other side. Assessments included global and 3D skin imaging at each visit. Pain intensity was evaluated using visual analogue scale (VAS) scores during the injection. Additionally, patient satisfaction and adverse events were documented.

**Results:** Findings revealed that Global Aesthetic Improvement Scale scores and patient satisfaction were significantly higher with the CureJet compared to the needle injection method. VAS scores were notably lower on the CureJet side. Improvements in both pore and wrinkle indices were observed from baseline, with a more pronounced improvement rate on the CureJet side compared to the needle injection side.

**Conclusions:** Needle-free injection of PN for aging skin was found to be effective in enhancing pore and wrinkle improvement, while reducing associated discomfort.

#### 1 | Introduction

Aged skin presents various aging indicators, including loss of elasticity, epidermal thinning, diminished collagen levels, increased wrinkles, and enlarged pores [1]. Skin aging typically involves reduced collagen production, structural alterations in the collagen fiber network, and accumulation of degenerated elastic fibers in the papillary and mid-dermis [2]. Due to the significant social implications of skin aging, there is an increasing demand for minimally invasive dermal rejuvenation procedures

with short downtime. Numerous facial fillers and skin boosters have been developed to meet this need [3].

Purified polynucleotide (PN) derived from the germ cells of salmon and other fish is widely utilized for this purpose [4]. Research indicates that PN aids in the proliferation of dermal fibroblasts and stimulates angiogenesis, contributing to effective wound healing [5, 6]. Additionally, previous studies have shown that intradermal PN filler injections enhance skin elasticity and collagen synthesis by activating fibroblasts [7]. However, a

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1 of 6

## 6) Tx - Scar



## 6) Tx - Skin booster



Courtesy of Jimin Lee (M.D.)

## 6) Tx - Stretch marks



Courtesy of Jimin Lee (M.D.)

## 6) Tx – Hair



**NEWHAIR**

Courtesy of Jinh Kim (M.D.)

# INDEX

- 01 NFJI (Needle-free jet injector)

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- 02 NOVOJET

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- 03 Before&After

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# III. Before&After

Indication	Scar
<b>Solution</b>	PDLLA (JUVELOOK) one vial containing 42.5 mg of PDLLA and 7.5 mg of non-cross-linked HA was diluted with 8 mL of physiologic saline and vortexed for 2 h before administration
<b>Power</b>	Level 5
<b>Volume</b>	1.5–2 mL per each cheek
<b>Hz</b>	3Hz
<b>Method</b>	5mm contact



**Before**



**1<sup>st</sup> session after**

# III. Before&After

Indication	Scar
Solution	PDLLA (JUVELOOK) one vial containing 42.5 mg of PDLLA and 7.5 mg of non-cross-linked HA was diluted with 8 mL of physiologic saline and vortexed for 2 h before administration
Power	Level 5
Volume	1.5–2 mL per each cheek
Hz	3Hz
Method	5mm contact



**Before**



**1<sup>st</sup> session after**

# III. Before&After

<b>Indication</b>	<b>Chicken pox scar</b>
<b>Solution</b>	PDLLA (JUVELOOK) 15cc mix
<b>Power</b>	Level 3 (120 Volts) <i>(Pro mode : Level 8)</i>
<b>Interval</b>	4 weeks
<b>Volume</b>	2-3
<b>Hz</b>	3-5
<b>Method</b>	5mm contact



**Before**



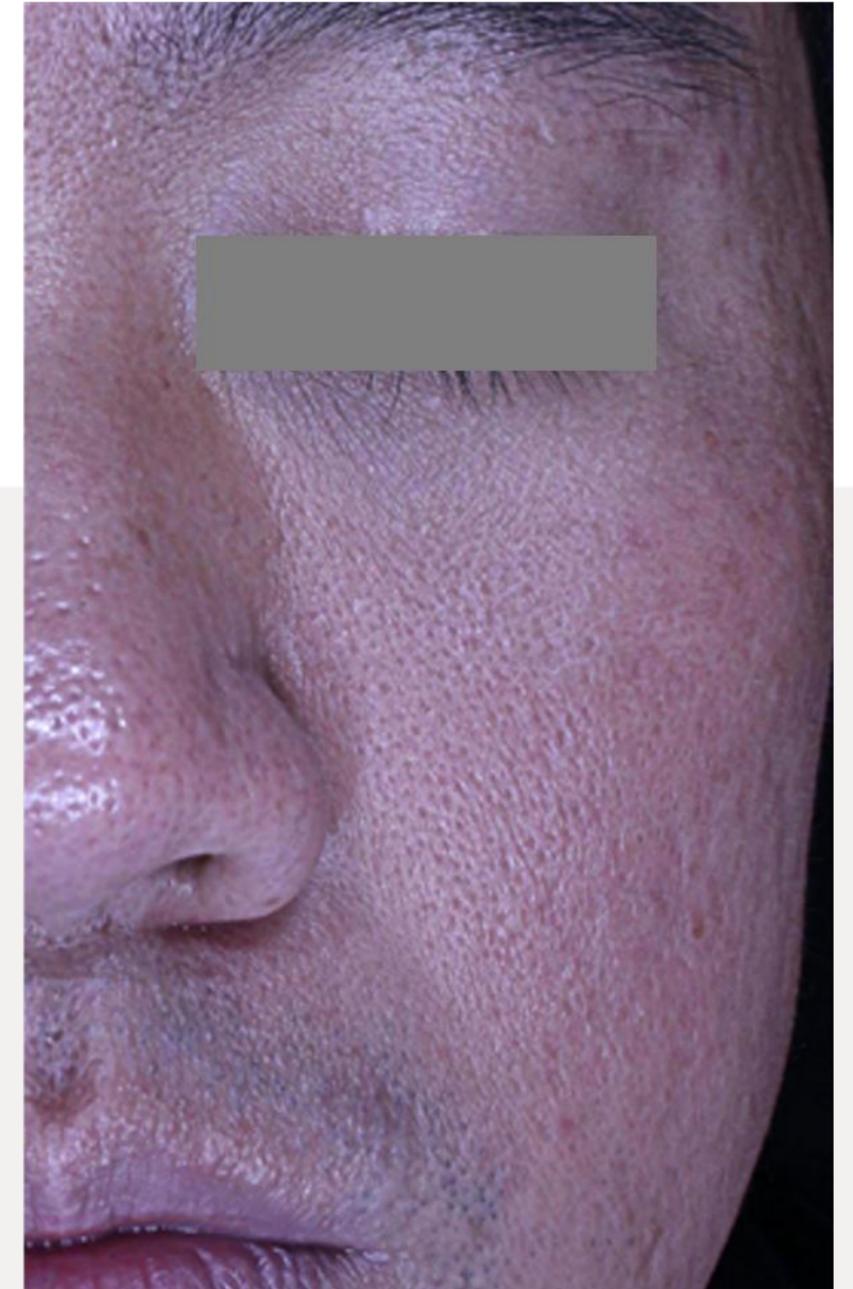
**After 2<sup>nd</sup> session**

# III. Before&After

<b>Indication</b>	<b>Scar Skin Texture Pore Brightening</b>
<b>Solution</b>	PDLLA (JUVELOOK)
<b>Interval</b>	4 weeks
<b>Power</b>	-
<b>Volume</b>	-
<b>Hz</b>	-
<b>Method</b>	-



**Before**



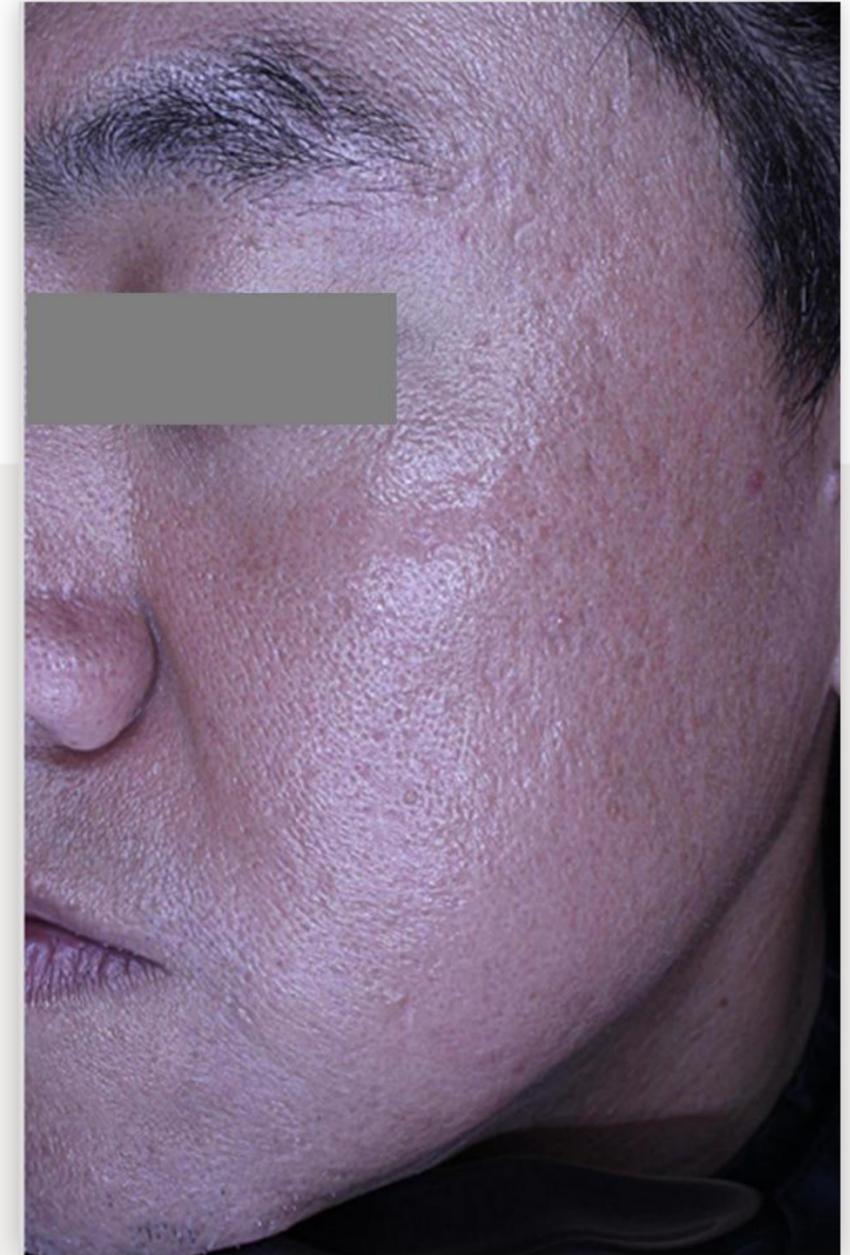
**After 2<sup>nd</sup> session**

# III. Before&After

<b>Indication</b>	<b>Scar Skin Texture Pore Brightening</b>
<b>Solution</b>	PDLLA (JUVELOOK)
<b>Interval</b>	4 weeks
<b>Power</b>	-
<b>Volume</b>	-
<b>Hz</b>	-
<b>Method</b>	-



**Before**



**After 2<sup>nd</sup> session**

# III. Before&After

Indication	Pore
<b>Solution</b>	PDLLA (JUVELOOK), PDRN (Revoco Inj.) - Total: 4cc - JUVELOOK (2.5cc) & Normal saline (1cc) & PDRN (0.5cc)
<b>Interval</b>	2-3 weeks
<b>Power</b>	4 (140V) (Pro mode : Level 13)
<b>Volume</b>	4
<b>Hz</b>	10
<b>Shot</b>	2,000 shots
<b>Method</b>	20mm distance



**Before**



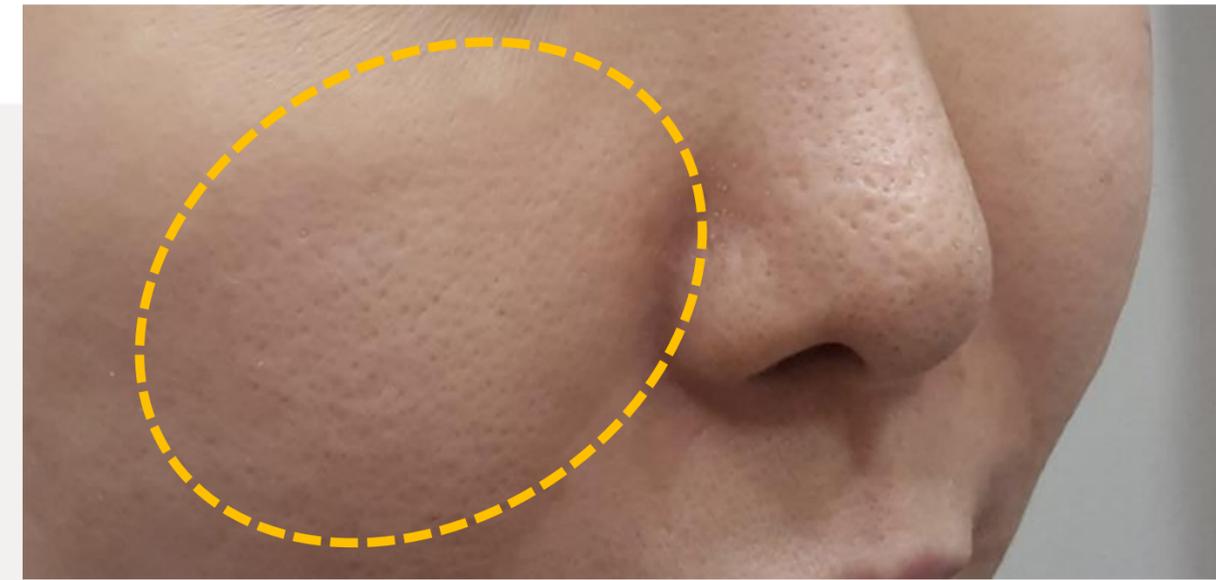
**3 weeks after 3<sup>rd</sup> session**

# III. Before&After

Indication	Pore
<b>Solution</b>	PDLLA (JUVELOOK), PDRN (Revoco Inj.) - Total: 4cc - JUVELOOK (2.5cc) & Normal saline (1cc) & PDRN (0.5cc)
<b>Interval</b>	2-3 weeks
<b>Power</b>	4 (140V) (Pro mode : Level 13)
<b>Volume</b>	4
<b>Hz</b>	10
<b>Shot</b>	2,000 shots
<b>Method</b>	20mm distance



**Before**



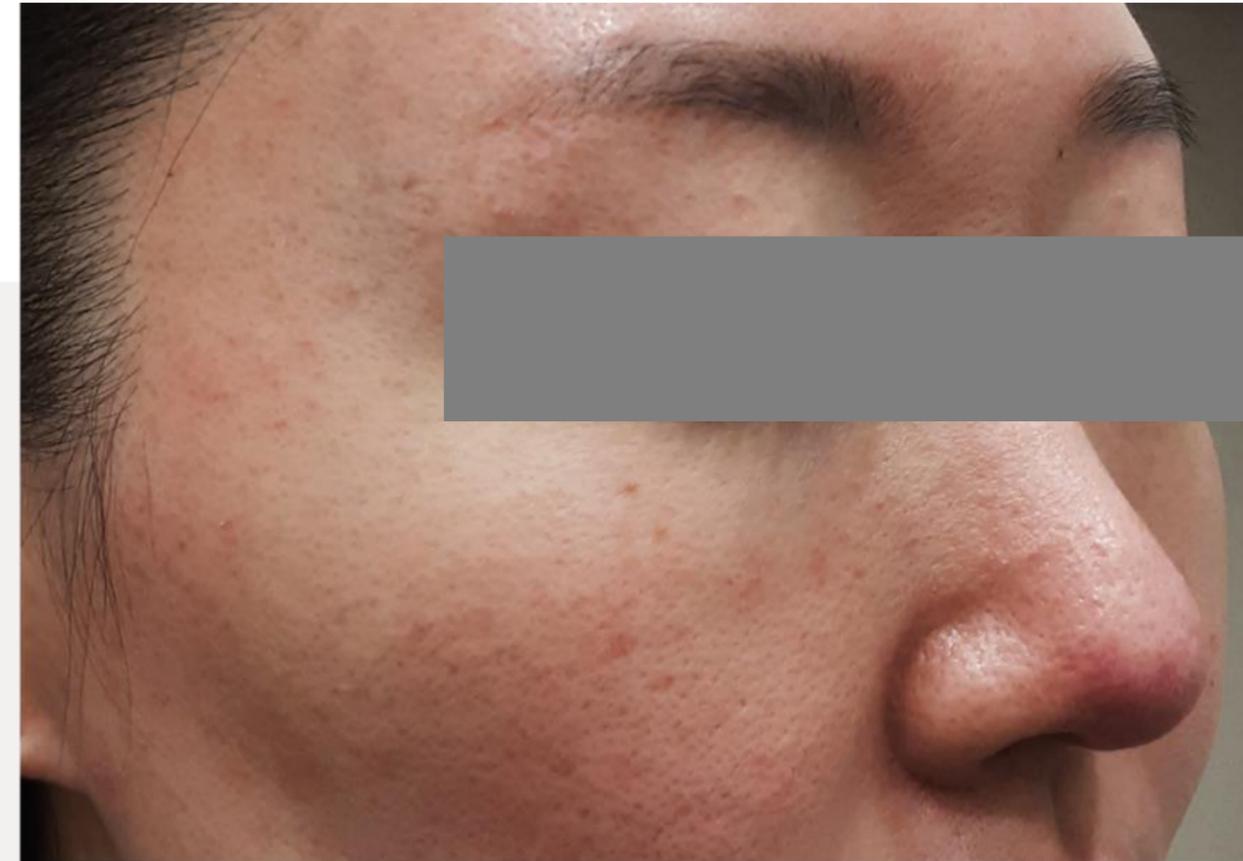
**3 weeks after 3<sup>rd</sup> session**

# III. Before&After

Indication	Rosacea
Solution	PRP 3cc
Combination Tx	micro-needle RF → CUREjet - Soolantra cream, Isotretinoin
Interval	3-4 weeks
Power	4 (140V) (Pro mode : Level 13)
Volume	4
Hz	10
Shot	1,500 shots
Method	20mm distance



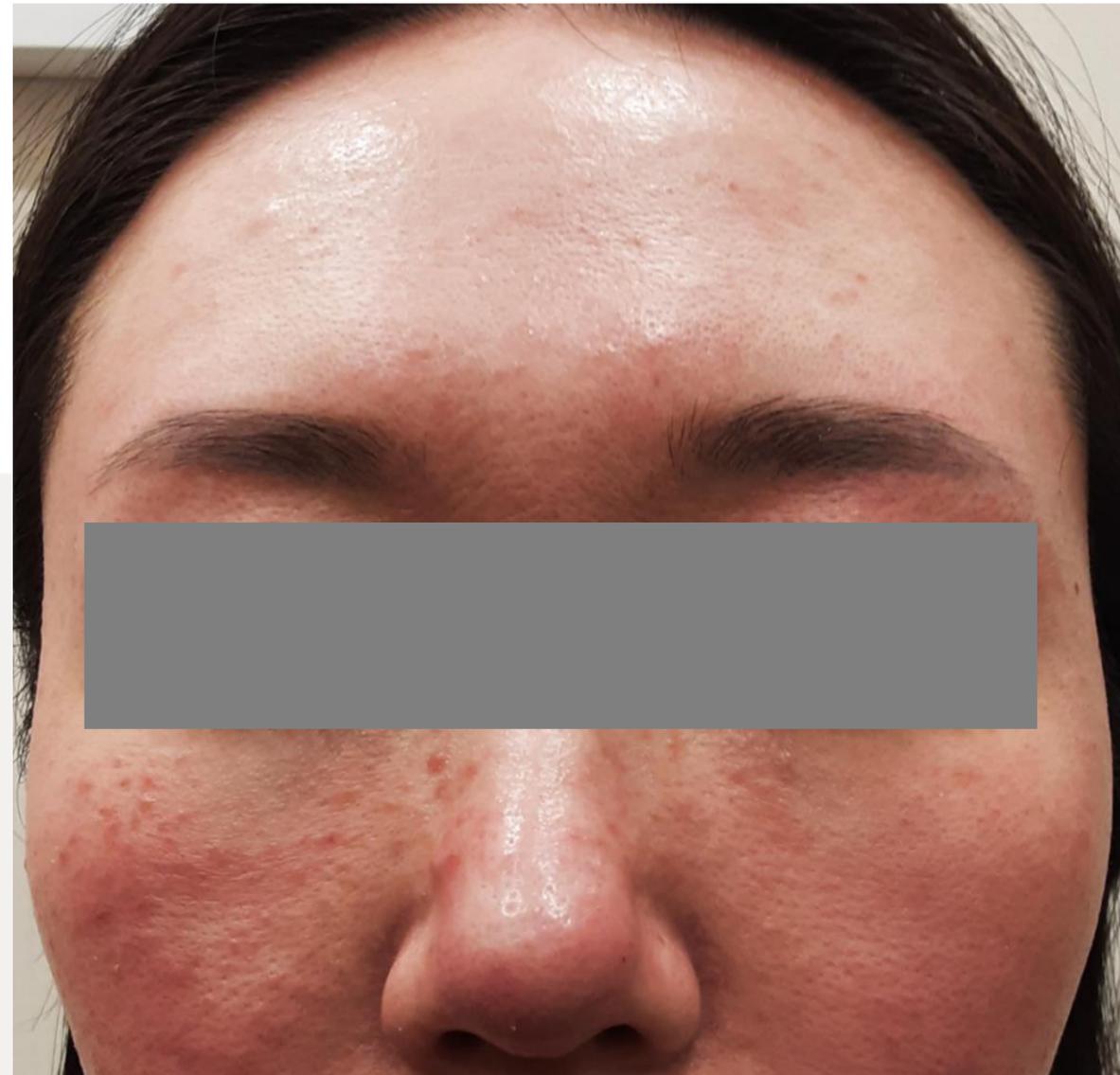
**Before**



**16 weeks after 3<sup>rd</sup> session**

# III. Before&After

Indication	Rosacea
Solution	PRP 3cc
Combination Tx	micro-needle RF → NOVOJET - Soolantra cream, Isotretinoin
Interval	3-4 weeks
Power	4 (140V) (Pro mode : Level 13)
Volume	4
Hz	10
Shot	1,500 shots
Method	20mm distance



**Before**



**16 weeks after 3<sup>rd</sup> session**

# III. Before&After

Indication	Pore, Acne
Solution	PRP 3cc
Combination Tx	micro-needle RF → NOVOJET - Isotinoone soft cap.
Interval	4 weeks
Power	4 (140V) (Pro mode : Level 13)
Volume	4
Hz	10
Shot	1,300 shots
Method	20mm distance



**Before**



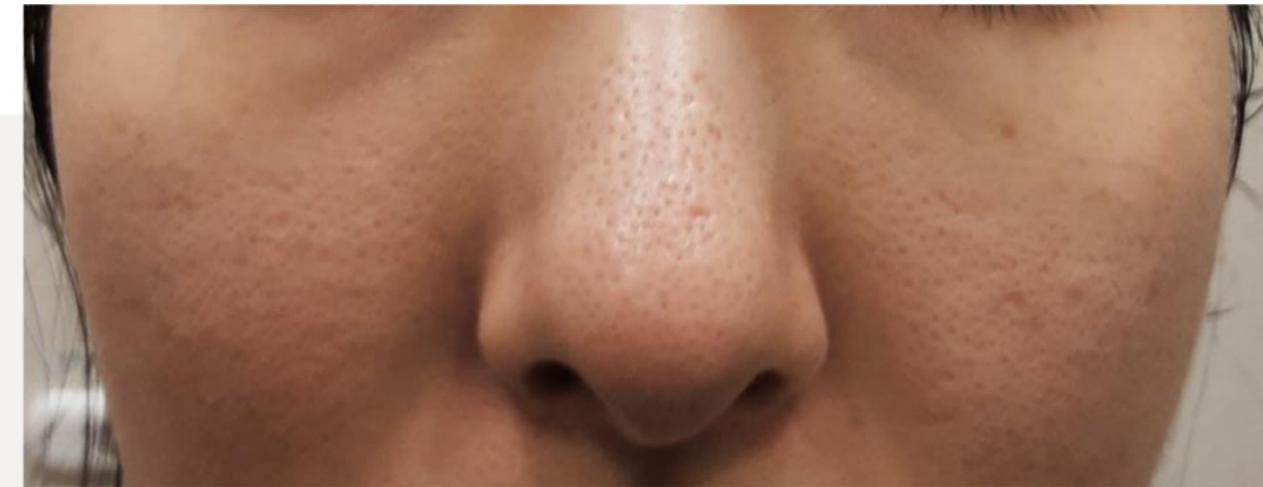
**9 weeks after 3<sup>rd</sup> session**

# III. Before&After

Indication	Pore, Acne
Solution	PRP 3cc
Combination Tx	micro-needle RF → NOVOJET - Isotinoone soft cap.
Interval	4 weeks
Power	4 (140V) (Pro mode : Level 13)
Volume	4
Hz	10
Shot	1,300 shots
Method	20mm distance



**Before**



**9 weeks after 3<sup>rd</sup> session**

# III. Before&After

Indication	Melasma
Solution	PRP 3cc
Combination Tx	*2 <sup>nd</sup> , 3 <sup>rd</sup> session: micro-needle RF → NOVOJET - Melansamin-jung (tranexamic acid cap.)
Interval	~5 weeks
Power	4 (140V) (Pro mode : Level 13)
Volume	3
Hz	10
Shot	1,500 shots
Method	20mm distance



**Before**



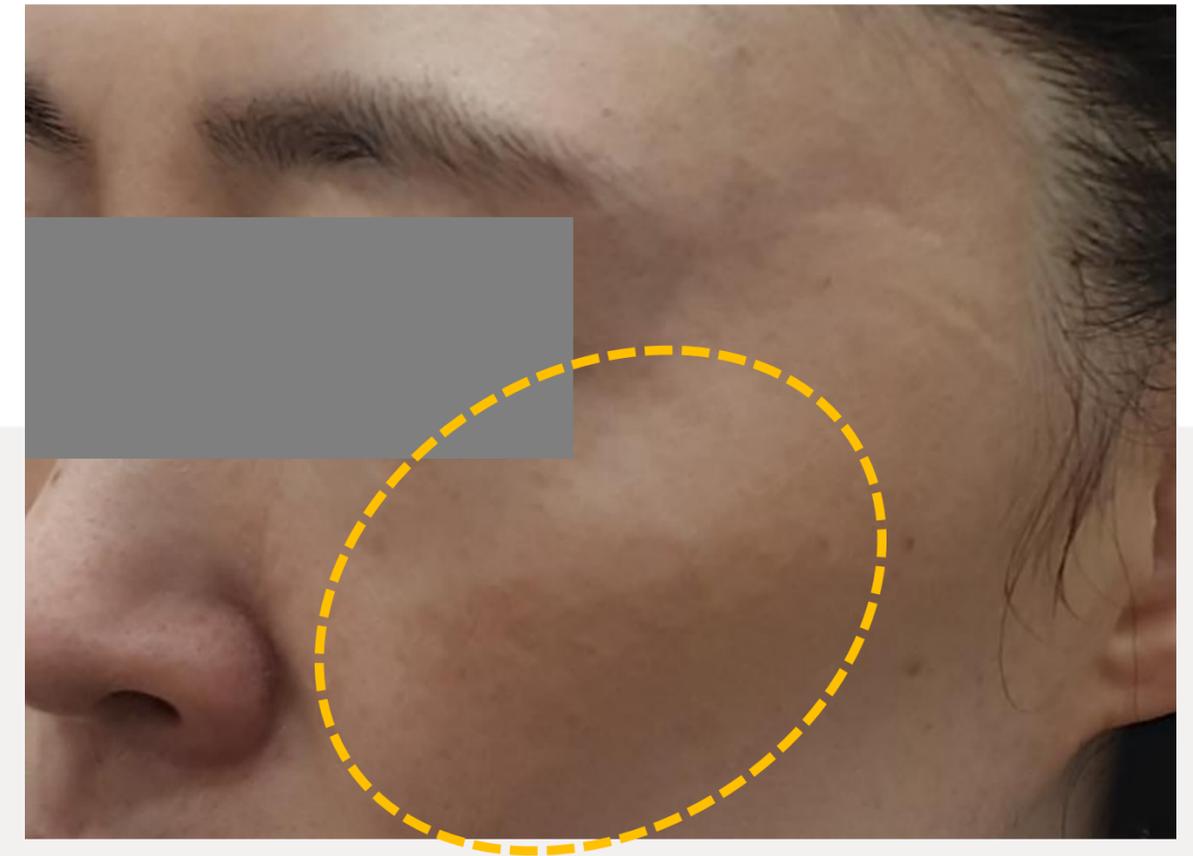
**7 weeks after 3<sup>rd</sup> session**

# III. Before&After

Indication	Melasma
Solution	PRP 3cc
Combination Tx	*2 <sup>nd</sup> , 3 <sup>rd</sup> session: micro-needle RF → NOVOJET - Melansamin-jung (tranexamic acid cap.)
Interval	~5 weeks
Power	4 (140V) (Pro mode : Level 13)
Volume	3
Hz	10
Shot	1,500 shots
Method	20mm distance



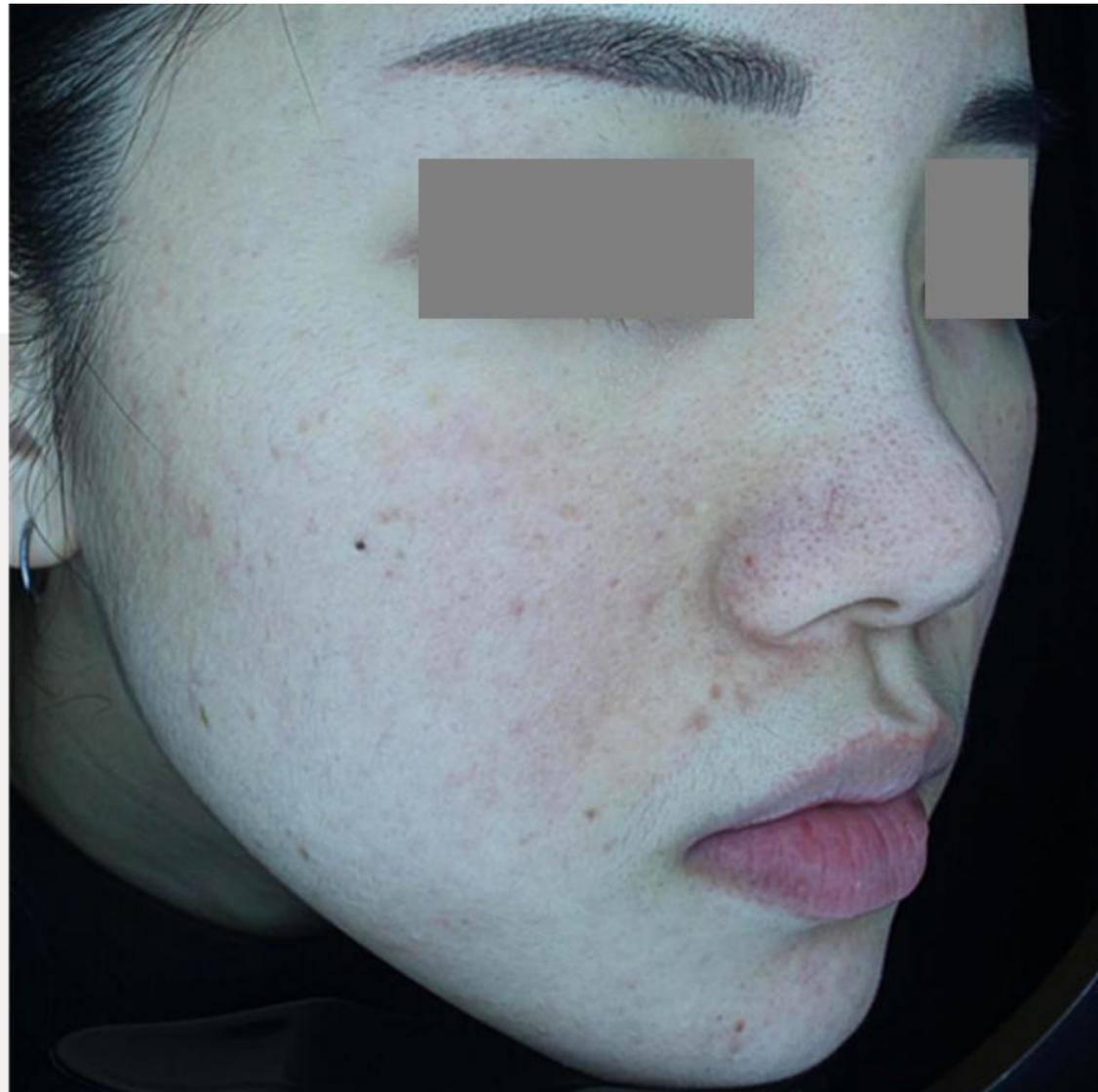
**Before**



**7 weeks after 3<sup>rd</sup> session**

# III. Before&After

<b>Indication</b>	<b>Skin Texture (Millet Acne) Rosacea</b>
<b>Solution</b>	WFI (Water For Injection)
<b>Interval</b>	2-3 days
<b>Power</b>	-
<b>Volume</b>	-
<b>Hz</b>	-
<b>Method</b>	-



**Before**



**After 12<sup>th</sup> session**

# III. Before&After

<b>Indication</b>	<b>Skin Texture (Millet Acne) Rosacea</b>
<b>Solution</b>	Normal Saline
<b>Interval</b>	2-3 days
<b>Power</b>	-
<b>Volume</b>	-
<b>Hz</b>	-
<b>Method</b>	-



**Before**



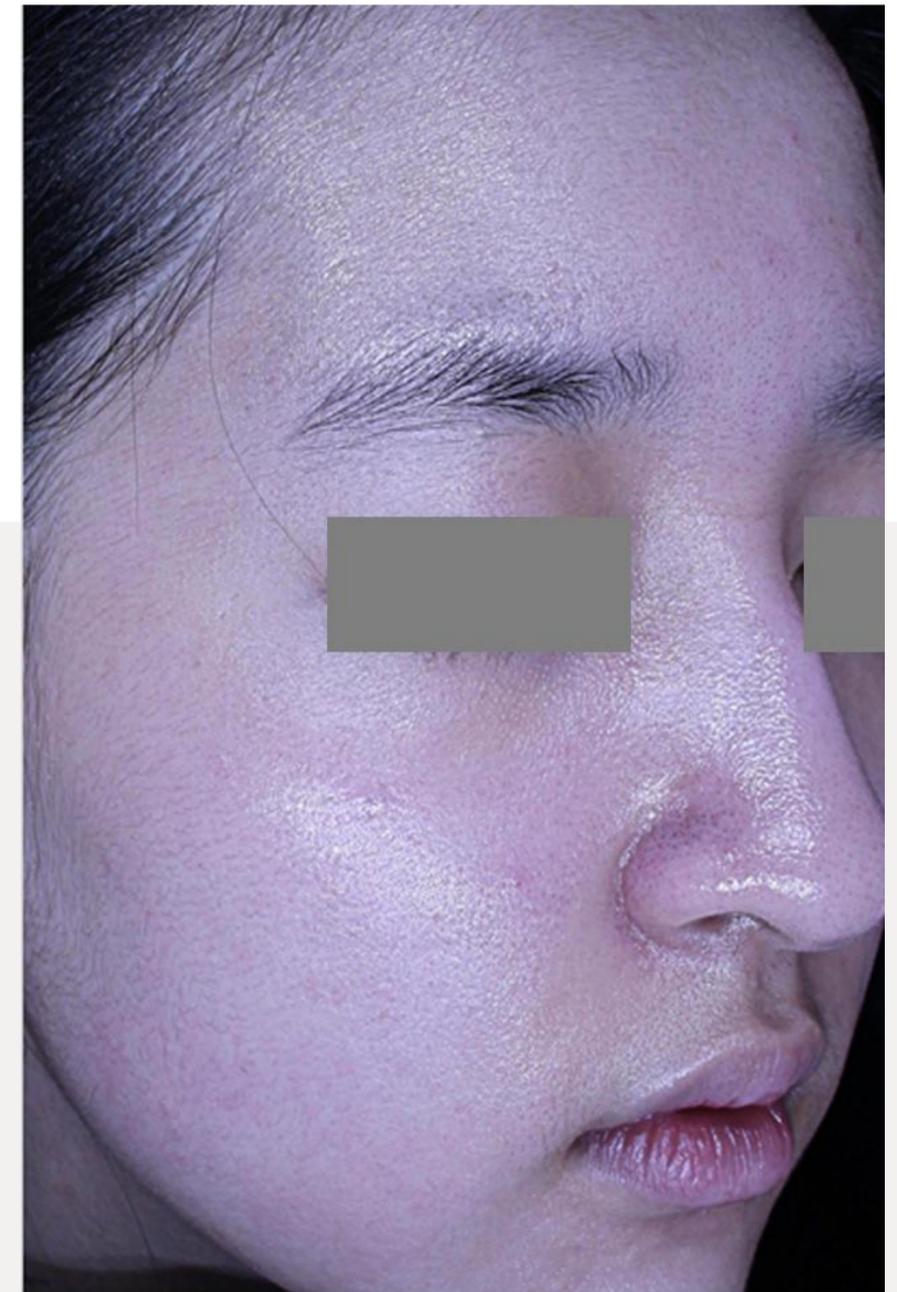
**After 20<sup>th</sup> session**

# III. Before&After

Indication	Skin Hydration Brightening
Solution	NovoStem Plus (Human Fibroblast Conditioned Media)
Interval	1 week
Power	-
Volume	-
Hz	-
Method	-



**Before**



**2 weeks after 2<sup>nd</sup> session**

# III. Before&After

Indication	Enhance Skin hydration Radiance
Solution	NovoStem Plus (Human Fibroblast Conditioned Media)
Interval	1 week
Power	-
Volume	-
Hz	-
Method	-



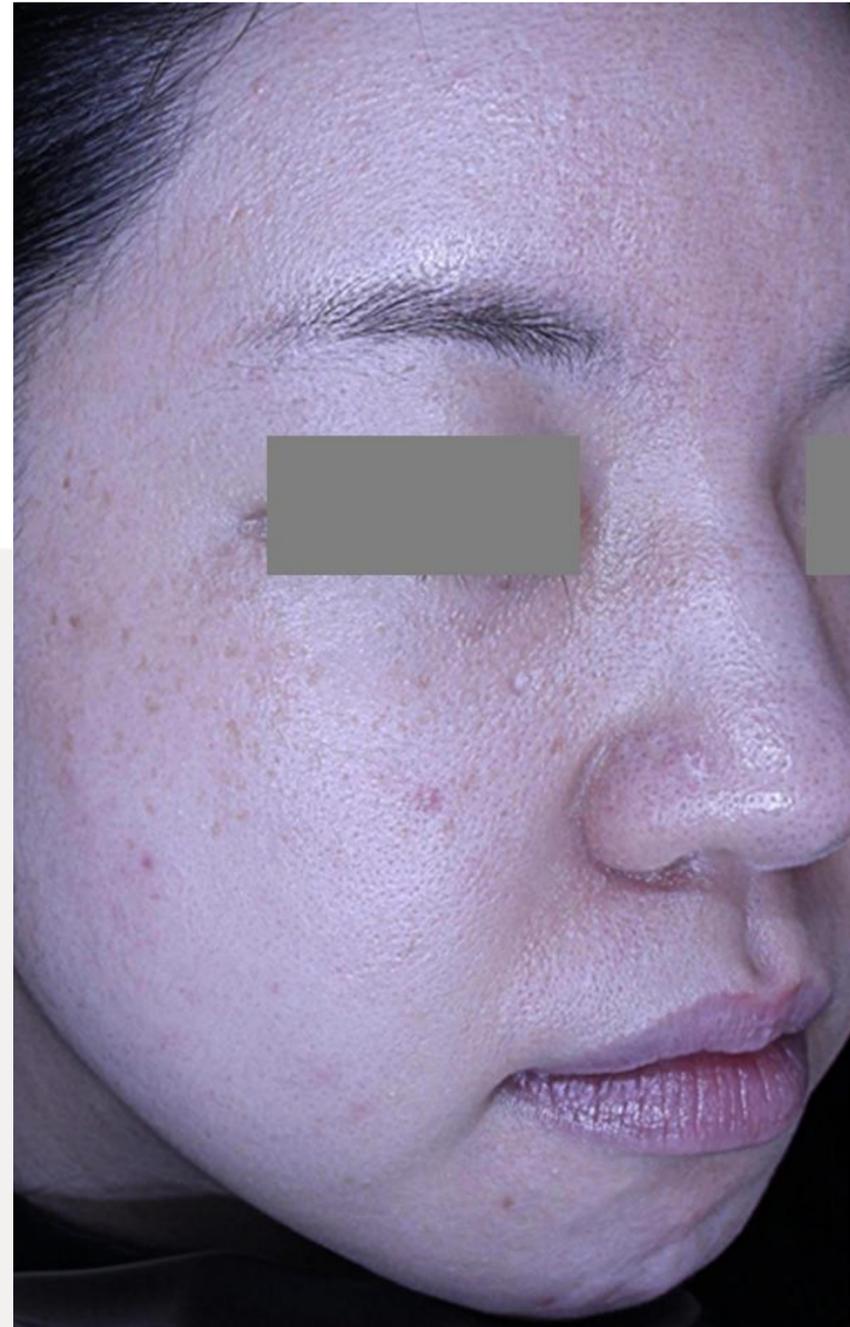
**Before**



**3 weeks after 3<sup>rd</sup> session**

# III. Before&After

<b>Indication</b>	<b>Enhance Skin hydration Radiance</b>
<b>Solution</b>	NovoStem Plus (Human Fibroblast Conditioned Media)
<b>Interval</b>	1 week
<b>Power</b>	-
<b>Volume</b>	-
<b>Hz</b>	-
<b>Method</b>	-



**Before**



**3 weeks after 3<sup>rd</sup> session**

# III. Before&After

Indication	Pore & Rejuvenation
Solution	NMN
Interval	-
Power	4 (Pro mode: Lv. 13)
Volume	3
Hz	10, 15
Method	5mm distant



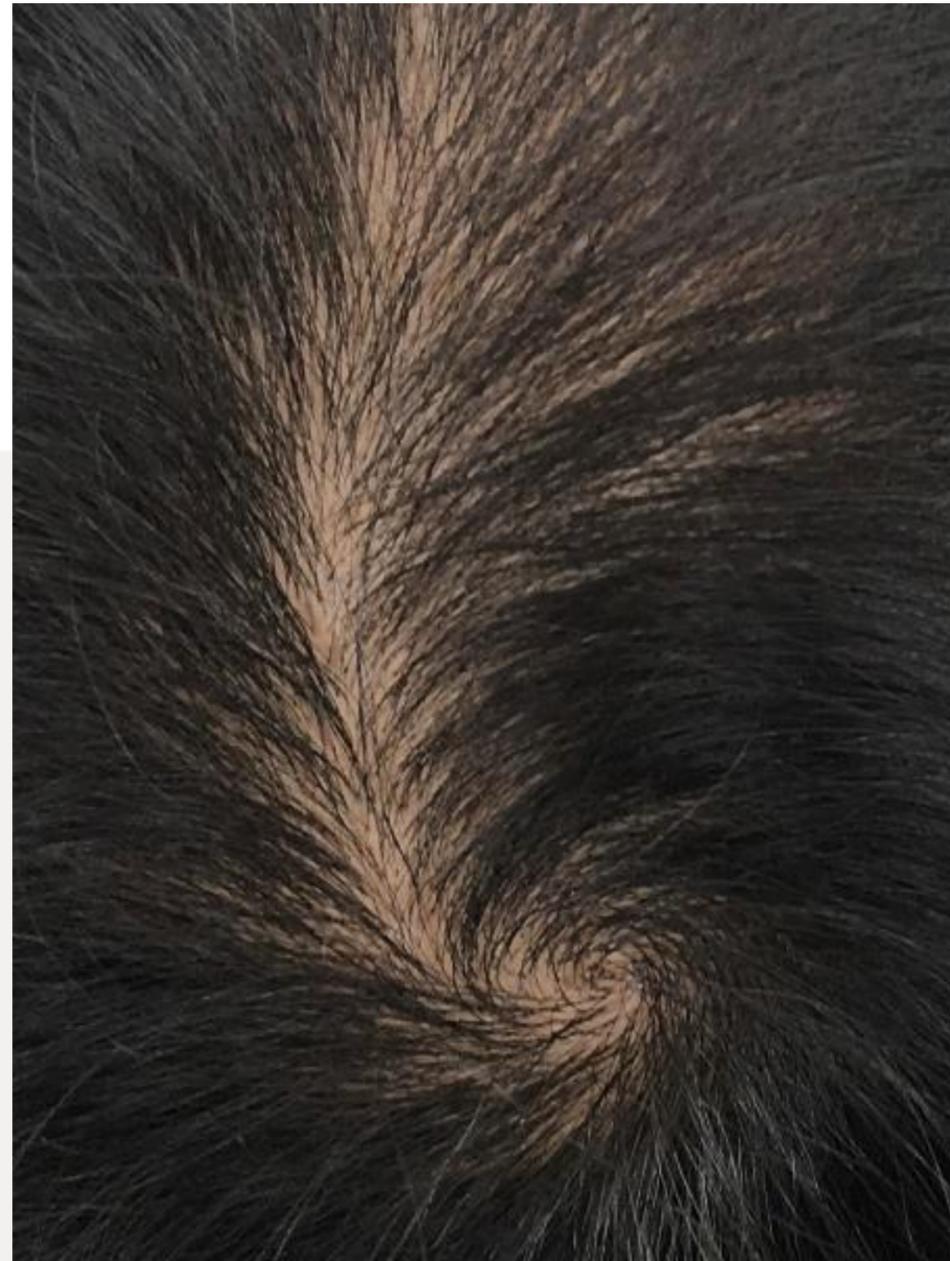
**Before**



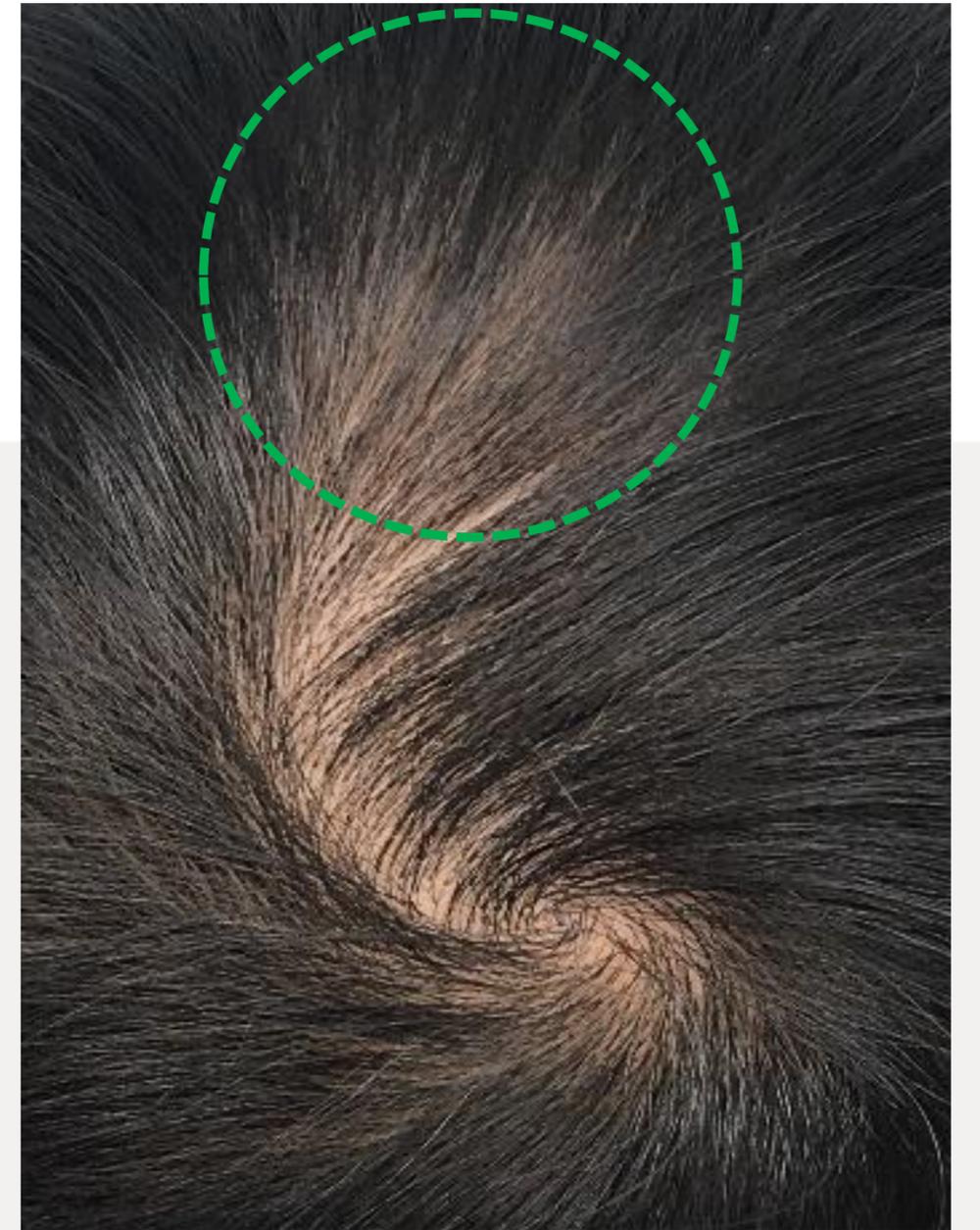
**2 weeks after 1<sup>st</sup> session**

# III. Before&After

Indication	Scalp
Solution	Exosome
Interval	4 weeks
Power	-
Volume	-
Hz	-
Method	-



**Before**



**12 weeks after 3<sup>rd</sup> session**

# III. Before&After

Indication	Scalp
Solution	Exosome
Interval	4 weeks
Power	-
Volume	-
Hz	-
Method	-



**Before**



**12 weeks after 3<sup>rd</sup> session**

# III. Before&After

Indication	Stretch Marks
Solution	PDLLA 15cc mix
Interval	4 weeks
Power	4 (Pro mode: Lv. 13)
Volume	5
Hz	3
Method	Contact



Before



After 2<sup>nd</sup> session

# III. Before&After

Indication	Stretch Marks
Solution	PDLLA 15cc mix
Interval	4 weeks
Power	4 (Pro mode: Lv. 13)
Volume	5
Hz	3
Method	Contact



Before



After 2<sup>nd</sup> session

# III. Before&After

Indication	Stretch Marks
Solution	PDLLA 15cc mix
Interval	4 weeks
Power	4 (Pro mode: Lv. 13)
Volume	5
Hz	3
Method	Contact



Before



After 2<sup>nd</sup> session

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THANK YOU

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