

Designed for  
**Perfection**

**EPN**

**Electroporation Needle System**



# Contents

**1. What is EPN?**

**2. EPN Principle**

**1) Automatic needling**

**2) Electroporation**

**3. Mechanism of Action**

**4. Device Feature & Technology**

**1) Microneedle + Electroporation**

**2) Electroporation**

**3) Ergonomic design**

**5. Clinical report**

# 1. What is EPN?

## EPN : Electroporation Needle system

EPN is the new generation of emerging technology with combining automatic needling (Auto Microneedle Therapy System, Auto MTS) and electroporation to effectively deliver a drug. EPN permits (by Auto MTS and electroporation) to effectively deliver a drug into different tissue depths within face or scalp.

By needling on the underlying skin tissue in shorter treatment times, it achieves more effective drug delivery through electrostimulating micro-pores that provides less discomfort to the patient.

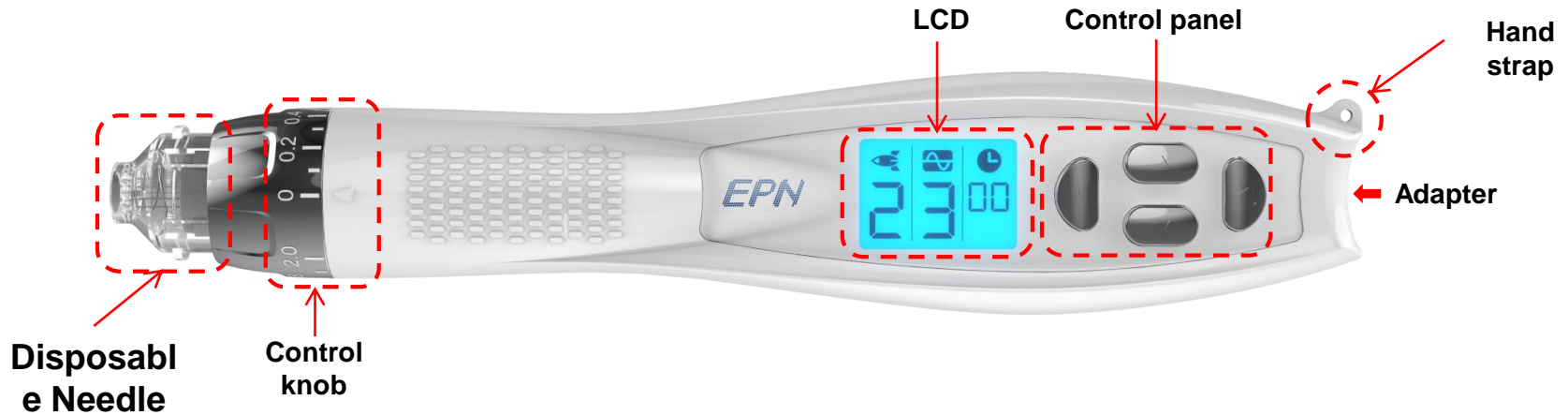
### ❖ Clinical Indication

- Hair regeneration
- Improving Surface scar & Deep scar
- Skin brightening
- Skin firming
- Pore contraction
- Improving wrinkle



# 1. What is EPN?

## Device Description

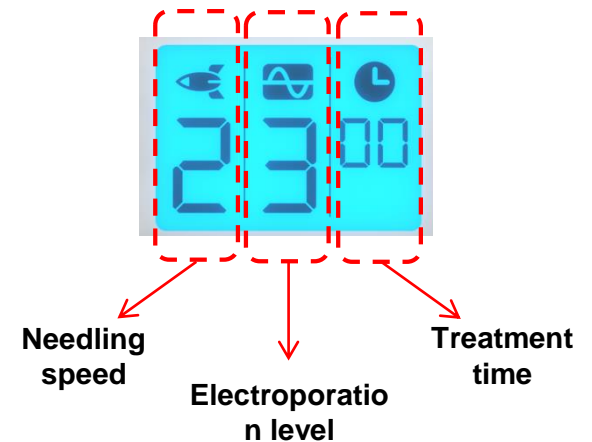


## Disposable needle



- Disposable sterilized needle
- 33 gauge 9 pin
- Electrode needle
- Adjustable control of multiple needle penetration depths, up to 2.0 mm
- Separately packaging – 24PCS/Box

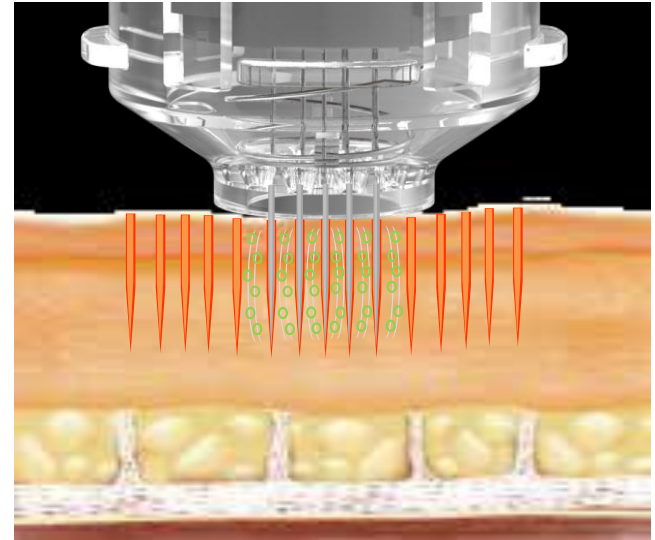
## LCD display



## 2. EPN Principle

### 2.1. Automatic needling (Auto MTS)

- ❖ Induces an effective drug delivery stimulating tissue by micro-needling and drug to permeate into the tissue
- ❖ Induces a drug with the high molecular weight to permeate into the dermal layer
- ❖ Induces skin tissue on scar tissue to regenerate throughout micro-pores

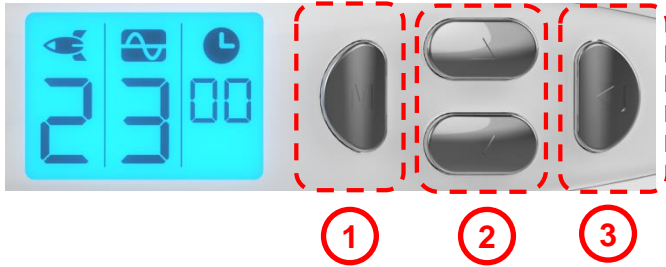


### 2.2. Microneedle electroporation

- ❖ Can be activated by microneedles penetrated into the dermal layer
- ❖ Makes micro-pores instantly on dermal fibroblast membranes
- ❖ Induces a drug with the high molecular weight to permeate into the fibroblasts

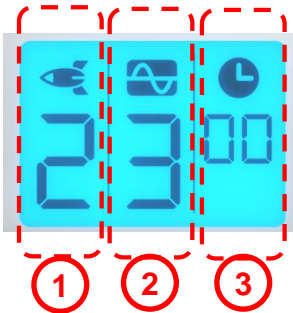
### 3. Mechanism of Action

Control panel



No	Description
1	Mode select button
2	Level decrease / increase button
3	Strat / Stop

LCD



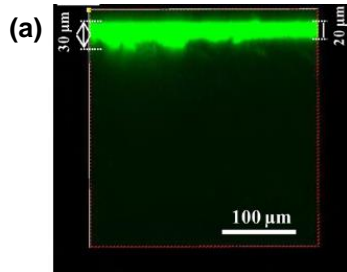
No	Description
1	Needling speed display
2	Electroporation level display
3	Treatment time display

# 4. Device Feature & Technology

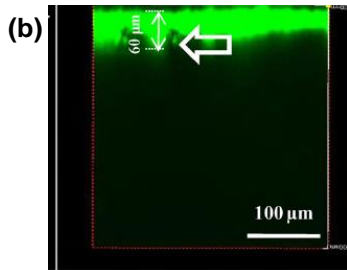
## Microneedle + electroporation

❖ Synergy effects of drug penetration

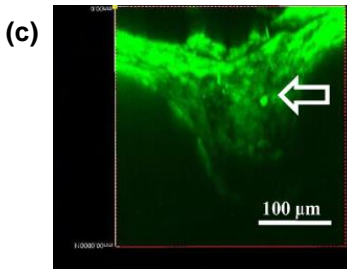
### Result



(a) Intact skin – penetration depth 30 μm



(b) Microneedle only – penetration depth 60 μm



(c) IN-SKIN EP (200 V, 10 ms, 10 pulses)

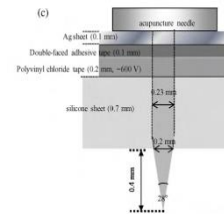
### Materials and methods

- Animal: Male hairless rats (Abdomen)
- Chemical: FD-4 (Fluorescein isothiocyanate (FITC)-dextran. Molecular weight 4.3 kDa)
- Observation: Fluorescence confocal laser scanning
- Electroporation: 200V / 10ms / 10 pulse
- Microneedle

#### IN-SKIN EP



- Microneedle penetration depth: 0.4 mm



### Reference

Yan K, Todo H, Sugibayashi K. Transdermal drug delivery by in-skin electroporation using a microneedle array. *Int J Pharm.* 2010 Sep 15;397(1-2):77-83.

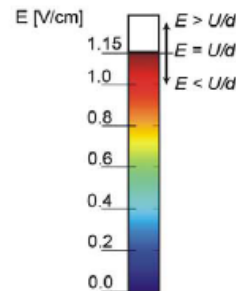
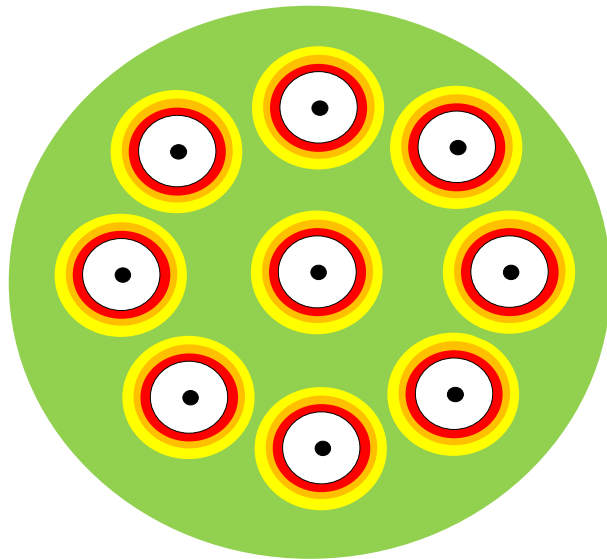
❖ **Microneedle with electroporation can effectively deliver high molecular and hydrophilic drugs.**

# 4. Device Feature & Technology

## Electroporation

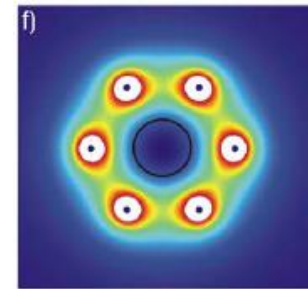
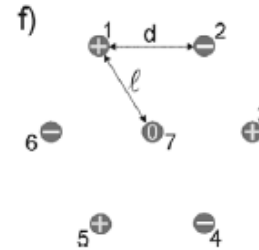
- ❖ Nine needle electrodes placed in a circle
  - 8 electrodes circular placement +single electrode central placement
- ❖ (+), (-) Cross-placement

**Electric field of EPN electrodes configuration**



**Reference**

Corović S, Pavlin M, Miklavcic D. Analytical and numerical quantification and comparison of the local electric field in the tissue for different electrode configurations. Biomed Eng Online. 2007 Oct 15;6:37.



(+), (-) Cross-placement  
→ Constant electric field

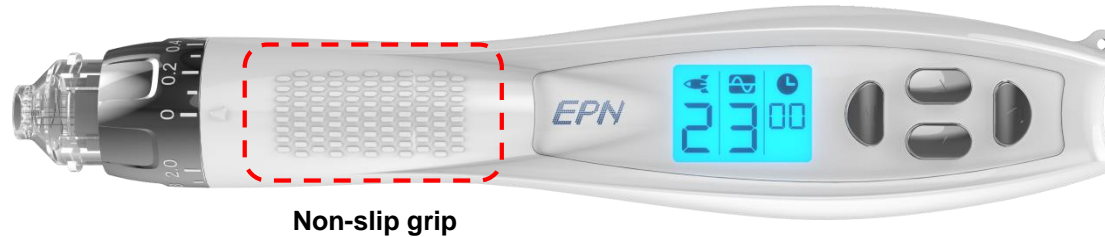
※ EPN provide constant electric field to all the tissue between the electrodes.



# 4. Device Feature & Technology

## Ergonomic design

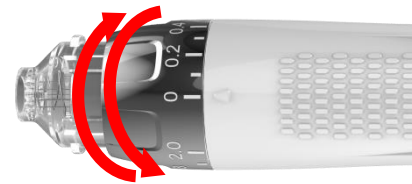
- ❖ A non-slip grip
- ❖ Operator-friendly handle as a pen type, enabling fatigue-free procedures



- ❖ Direct access to mount and dismount



Needle connection



Needle depth control

## 5. Clinical report

- ❖ Patient: Androgenetic alopecia patient
- ❖ Treatment region: Scalp
- ❖ Treatment cycle: 1 time per week

### ◆ Patient 1: Early 30s, male



Before



3<sup>rd</sup> treatment



9<sup>th</sup> treatment



12<sup>th</sup> treatment

### ◆ Patient 2: Mid 30s, male



Before



4<sup>th</sup> treatment

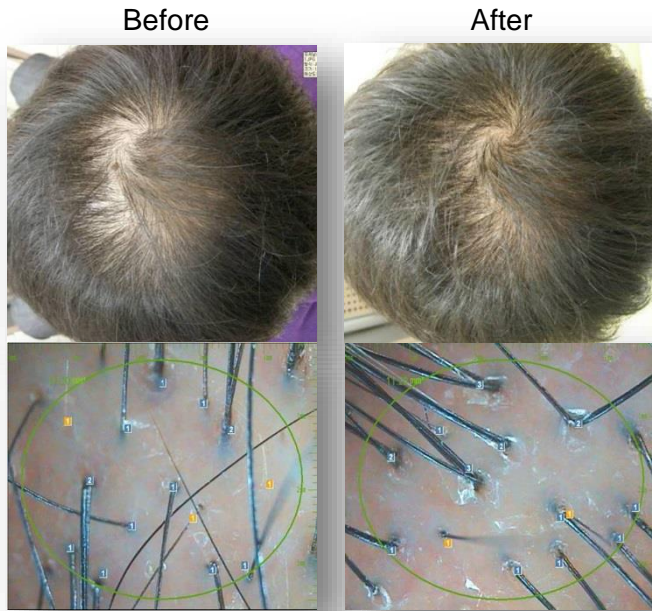


10<sup>th</sup> treatment

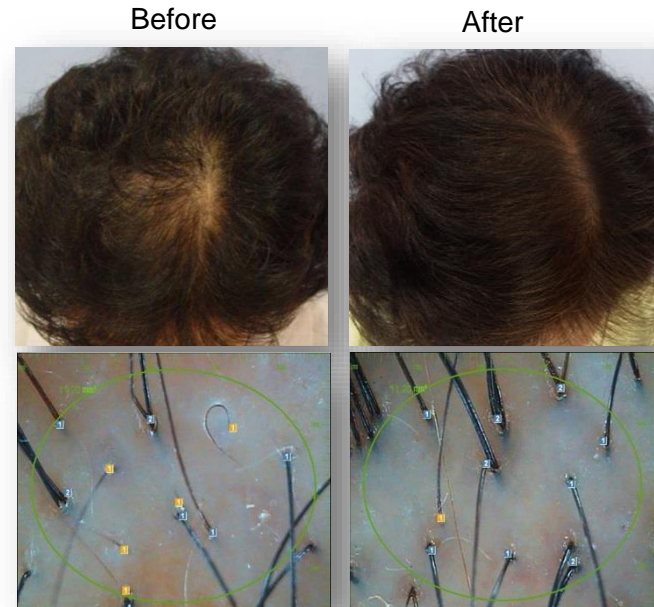
## 5. Clinical report

- ❖ Patient: alopecia patient
- ❖ Treatment region: Scalp (crown of the head)
- ❖ Treatment cycle: 1 time per week

◆ Patient 3: 40s, male



◆ Patient 4: 40s, female



## 5. Clinical report

- ❖ Patient: alopecia patient
- ❖ Treatment region: Scalp (crown of the head)
- ❖ Treatment cycle: 1 time per week

◆ Patient 5: 40s, male

Before



After



◆ Patient 6: 20s, male

Before



After





# EPN (Electroporation Needle System)

[자료: 2017, EunSung Global Lab.]



[Before]



[After]

Sex / Age	Treatment
M / The latter of 50's	2 months later
	10 session

# EPN (Electroporation Needle System)

[자료: 2017, EunSung Global Lab.]



[Before]



[After]

Sex / Age	Treatment
M / 33	4 months later
	10 session

# EPN (Electroporation Needle System)

[자료: 2017, EunSung Global Lab.]



[Before]



[After]

Sex / Age	Treatment
M / 36	6 months later
	21 session



# EPN (Electroporation Needle System)

[자료: 2017, EunSung Global Lab.]



**[Before]**



**[After]**

Sex / Age	Treatment
M / 34	2 session



# 5. Clinical report

- ❖ Treatment region: Face
- ❖ Treatment cycle: 1 time per week

◆ Patient 7: Early 20s, male

- Acne scar

Before



After



◆ Patient 8: 40s, female

- Nasolabial line

Before



After



# Thank you

FOR FURTHER INFORMATION, PLEASE CONTACT US AT  
**[es@esglobal.co.kr](mailto:es@esglobal.co.kr)**