The breakthrough device for transdermal drug delivery

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Disclaimer

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Skin structure

The stratum corneum layer is acting as a very strong barrier. Physiochemical constraints effectively limit the passive permeation of many known therapeutics.
Laser to create ultra-precise micropores
Modifications of micropores

Quality requirements:

High-precision pore geometry

Intra - and transdermal Drug Delivery

P.L.E.A.S.E.® Delivery of large molecular drugs

- cylinder-shaped profile
- absence of lateral tissue carbonization
- highly variable depth penetration
- precise ablation steps

- ideally-shaped pore
- effective passage and drug uptake
- targeted delivery at specific depths
- precise ablation steps
Modifications of micropores

**Precisely controllable micropore density**

Adjustable skin permeation levels for precise amount control of substance delivered over time

- < 1 %
- ~15 %

Micropore density range settings in %

larger substance amounts delivered
Modifications of micropores

Standard ablative laser vs. P.L.E.A.S.E.® Professional

Ideally addresses intra- and transdermal drug delivery requirements
Skin structure

P.L.E.A.S.E.® Professional
Modification of Micropores

Intra- and transdermal Drug Delivery

Advanced Pulse Forming

Drug Delivery:
- Epidermal
- Intradermal
- Transdermal

- Precise depth control
- Cold ablation

Langerhans Cells
Collagen and elastin fibers
Dendritic Cells
Skin structure

XY-image of the P.L.E.A.S.E.® micropore created in porcine skin.

XZ-cross section of the P.L.E.A.S.E.® micropore created in porcine skin.

in cooperation with Dr Yogeshvar N. Kalia, University of Geneva
Transdermal delivery without molecular size limitation

in cooperation with Dr Yogeshvar N. Kalia, University of Geneva
Transdermal delivery of FSH in women (clinical POC)

First pregnancy achieved!

in cooperation with LTS Lohmann Therapie-Systeme AG and IVF Centres Prof. Zech
Actinic keratosis

Before treatment with P.L.E.A.S.E.® and imiquimod

After 6 treatments with P.L.E.A.S.E.® and imiquimod during 20 days
Intradermal delivery

Cumulative lidocaine permeation (µg/cm²)

- 0 pores
- 150 pores
- 300 pores
- 450 pores
- 900 pores

Time (h)

0 4 8 12 16 20 24

in cooperation with Dr Yogeshvar N. Kalia, University of Geneva
Intradermal delivery – sd-rxRNA™

sd-rxRNA™ = novel, small asymmetric, hydrophobically modified RNAi compound developed by RXi Pharmaceuticals

Skin scar keloids: dermal fibrosis due to excessive expression of a protein, CTGF (connective tissue growth factor)

- Positive in vivo tests, siRNA uptake and gene silencing achieved by partner company
- Limitation: siRNA must currently be injected into scars
- P.L.E.A.S.E. is a less invasive method of delivery
- US potential market: up to $4 billion

Conclusions - in vitro skin

- There is qualitative evidence for dermal siRNA delivery following skin microporation
- Cellular transfection patterns appear comparable to those obtained by ID injection

Pig skin ex vivo, fibroblast transfection following ID injection

Evidence of dermal fibroblast transfection in P.L.E.A.S.E. microporated pig skin

in cooperation with RXi Pharmaceuticals
Epidermal delivery (pre-clinical POC)

Mouse model of allergic asthma (rec. grass pollen) n=18 in 3 groups: control, 6 injections SCIT, 6 P.L.E.A.S.E.® treatments

Results

- Transcutaneous Immunotherapy via P.L.E.A.S.E.® generated micropores equals SIT in efficacy
- Transcutaneous Immunotherapy induces a different systemic immune profile than SCIT
- P.L.E.A.S.E.® IT induces a decrease of pro-inflammatory cytokines
- SCIT induces an unwanted boost of Th2 cells

in cooperation with Biomay AG
Epidermal delivery (pre-clinical POC)

in cooperation with Biomay AG
## SYSTEM SPECIFICATIONS

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
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<tr>
<td>Laser type:</td>
<td>Diode-pumped Er:YAG</td>
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<tr>
<td>Wavelength:</td>
<td>2940 nm</td>
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<tr>
<td>Average output power:</td>
<td>Up to 2 W</td>
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<td>Pulse repetition rate:</td>
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<td>Pulse duration:</td>
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<td>Beam profile:</td>
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<td>Pore diameter:</td>
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<tr>
<td>Fluency:</td>
<td>Up to 25 J/cm²</td>
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<td>Aperture:</td>
<td>Variable, up to 14 x 14 mm</td>
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<tr>
<td>Pore density, coverage:</td>
<td>Variable, up to 15 %</td>
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<tr>
<td>Ablation depth:</td>
<td>Up to 2000 µm (theoretical value only!)</td>
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</table>
P.L.E.A.S.E.® Professional technical summary

Tabletop unit: (460 x 380 x 250 mm WxDxH)

Handheld unit: (65 x 220 x 90 mm WxDxH)

Touch screen with intuitive graphical interface

System weight: approx. 13 kg
Pantec Biosolutions company profile

Location
Pantec Biosolutions AG
Privately-owned
Ruggell, Liechtenstein

Foundation
2005

Products
P.L.E.A.S.E.® Professional for
dermatology applications
P.L.E.A.S.E.® IVF (Hormone patches
for IVF therapy in combination with
P.L.E.A.S.E.®)

Employees
20 FTEs within Pantec Biosolutions,
10 FTEs in strategic partnerships
Collaborations

- Global & Regional
- Transdermal
- Intradermal
- Epidermal

**You** have a molecule that profits from dermal delivery?

**We** add delivery, know-how, formulation expertise and a new patent position!
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