

Next-Level Rejuvenation by **INCUBE™**

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ALL IN ONE PLLACUBE™

LABINCUBE Co., Ltd., a global pioneer in porous material innovation, has launched PLLACUBE™, a cutting-edge cosmeceutical brand developed through years of intensive research.

PLLACUBE™ combines a precisely balanced blend of active ingredients and utilizes INCUBE™ to boost the activation of key components such as PLLA and PN, delivering an innovative solution in skin boosting.

This innovative skin booster, built on innovation research in advanced materials and biotechnology, maximizes ingredient synergy to transcend traditional skincare limitations.



What is **INCUBE™** ?

INCUBE™ developed by LabInCube Co., Ltd., is an innovative material based on proprietary molecular spacing technology, allowing for the selective encapsulation, protection.

The birth of a new INCUBE™ solution that has never existed before

What makes PLLACUBE All In One so unique?

Point 1

Rapid hydration through the LTQ™ technology and advanced porous structures
Ready to use in just 4 minutes
Easy and convenient

Point 2

With INCUBE™ new material, **protection of antioxidants** and **accelerated collagen synthesis** enhance user satisfaction

Point 3

Enhancing product quality with a manufacturing process for uniform, appropriately sized PLLA particles

Point 1

Easy and Convenient : **Ready to Use in Just 4 Minutes**

Dissolve Process



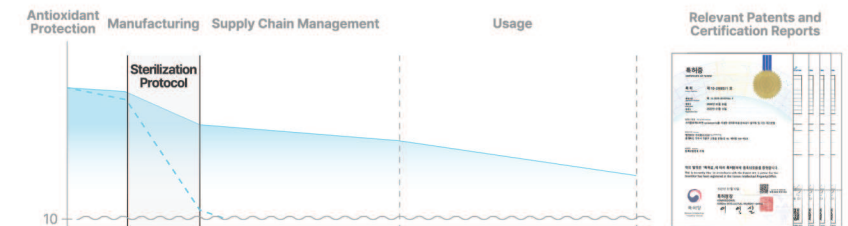
The LTQ™ technology and porous structure allow rapid Dissolve, allowing for **immediate use within 4 minutes**.

Point 2

Better Satisfaction : **Boosts Collagen Synthesis by Enhancing Antioxidant Protection**

Vitamin Stability Test

- Efficacy is immediately lost in Vitamin C and Glutathione under harsh conditions
- Vitamin C and Glutathione processed with INCUBE™ retain their efficacy even under harsh conditions
- After 200 days, antioxidant activity was confirmed to be maintained at 81.0%



The antioxidant properties of vitamin C and Glutathione are retained during sterilization and storage, maintaining their original effectiveness and **boosting collagen synthesis** through PLLA and PN upon use.

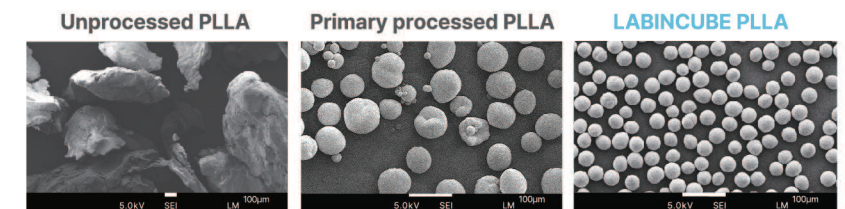
Antioxidant performance test conducted approximately 200 days post-production (DPPH radical scavenging activity test, Report No. 2024-I-1606)
Metal-organic framework designed for transdermal delivery using cyclodextrin, along with its manufacturing method (KR: 10-2488551)

Point 3

Superior Quality : **Safe PLLA Particle Manufacturing Technology**

PLLA Comparative Analysis

- The particle size of 30-80µm is specifically designed to prevent inflammation(phagocytosis) and the formation of nodules or granulomas caused by macrophages
- Proprietary manufacturing process ensures uniform, appropriately sized PLLA particles



Based on academic research, PLLA particles have uniform sizes, ranging from **30-80µm** for enhanced performance and efficacy.

References

The effect of phagocytosis of poly(L-lactic acid) fragments on cellular morphology and viability
Physicochemical Characteristics and Hydrolytic Degradation of polyactic Acid Dermal Fillers: A Comparative Study
Effect of Silica Particle Size on Macrophage Inflammatory Responses

PLLACUBE™

Original

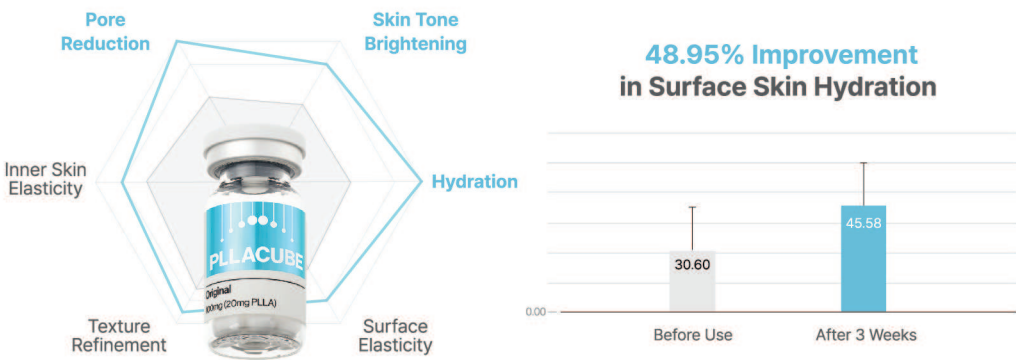


Product Information

Product Name	PLLACUBE Original
Volume & Composition	100mg (20mg PLLA) 10Vial
Purpose	Moisturizing, Brightening, Pore Reduction

Original

Graphical Comparison of Clinical Results for PLLACUBE Original



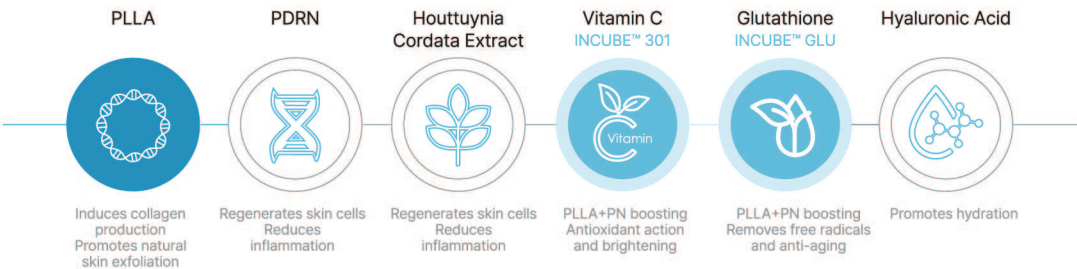
Study period: Jul. 23-Jul. 25, 2024 | Participants: 33 individuals | Study number: HM-P24-0335 | Testing center: Human Skin Clinical Testing Center Co., Ltd. | Study name: An application study evaluated PLLACUBE's efficacy after 3 weeks of use, focusing on improvements in surface and deep skin elasticity, surface and deep hydration, skin tone brightening, texture refinement, and pore reduction.

PLLACUBE Original Before & After Clinical Results(B&A)



Study period: Jul. 23-Jul. 25, 2024 | Participants: 33 individuals | Study number: HM-P24-0335 | Testing center: Human Skin Clinical Testing Center Co., Ltd. | Study name: An application study evaluated PLLACUBE's efficacy after 3 weeks of use, focusing on improvements in surface and deep skin elasticity, surface and deep hydration, skin tone brightening, texture refinement, and pore reduction.

Key Ingredients of PLLACUBE Original ALL IN ONE



* The above descriptions are limited to the characteristics of the ingredients

PLLACUBE™

PiNk VOL.

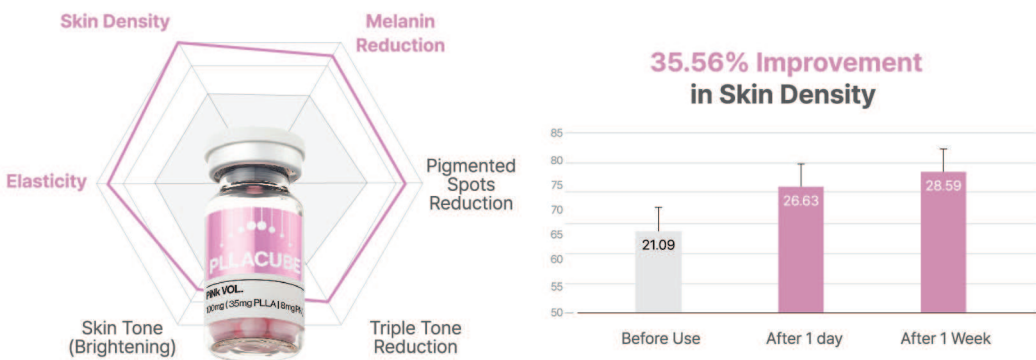


Product Information

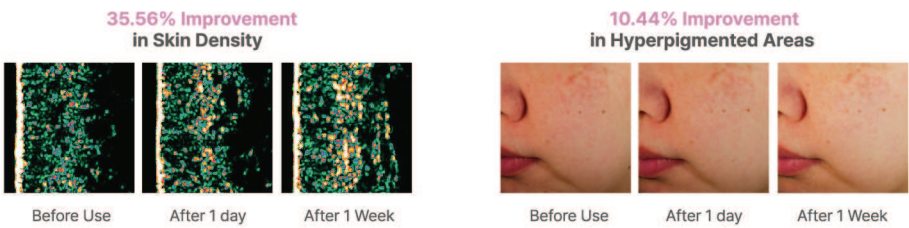
Product Name	PLLACUBE PiNk VOL.
Volume & Composition	100mg (35mg PLLA 8mg PN) 10Vial
Purpose	Elasticity, Brightening, Rejuvenation

PiNk VOL.

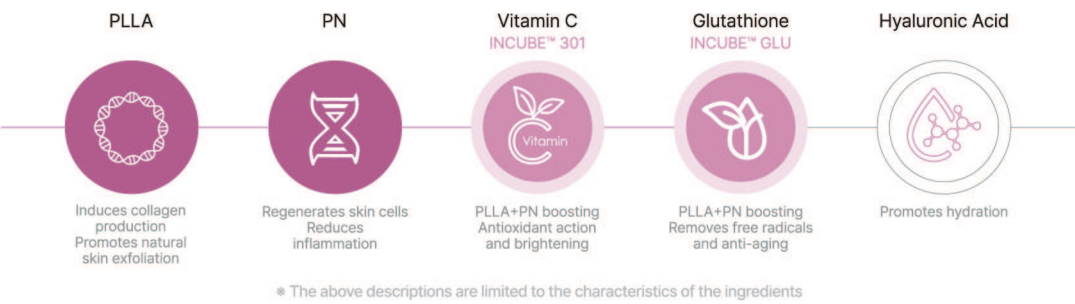
Graph Comparison of Clinical Results for PLLACUBE PiNk VOL.



PLLACUBE PiNk VOL. Before & After Clinical Results(B&A)



Key Ingredients of PLLACUBE PiNk VOL. ALL IN ONE



PLLACUBE™

CYTOBALANCE after 10

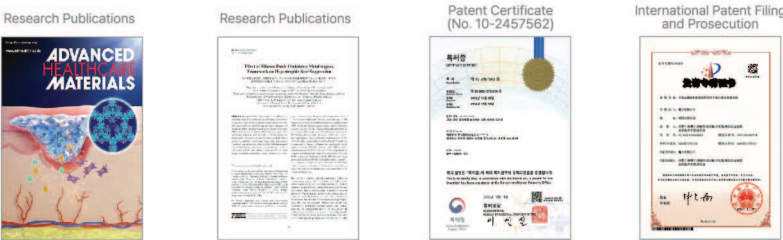


Product Information

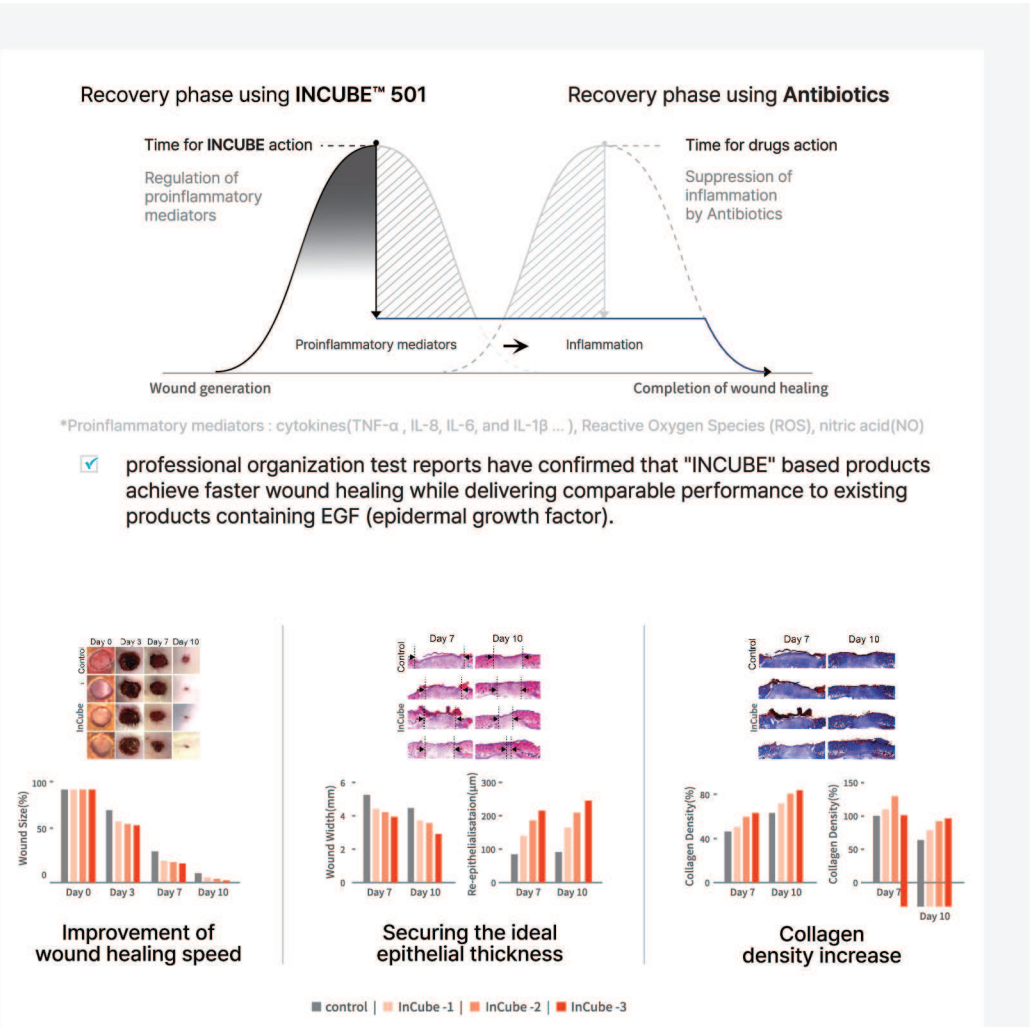
Product Name	PLLACUBE CYTOBALANCE after 10
Volume & Composition	150ml / 5.07fl.oz (Contains INCUBE™ 501)
Purpose	Inflammation management, Recovery acceleration, Moisturizing

What is INCUBE™ 501

Bpromote natural regeneration through the absorption of excessive inflammatory substances



Zirconium-Based Metal-Organic Framework Capable of Binding Proinflammatory Mediators in Hydrogel Form Promotes Wound Healing Process through a Multiscale Adsorption Mechanism.
Effect of Silicone Patch Containing Metal-organic Framework on Hypertrophic Scar Suppression.



Study period: Dec. 1, 2021-Mar. 31, 2022 | Participants: Seoul National University Bundang Hospital (SNUBH) | Study name: Comparative Evaluation of Biocompatibility and Wound Healing Efficacy of INCUBETM 501-Based Hydrogel

Zirconium-Based Metal-Organic Framework Capable of Binding Proinflammatory Mediators in Hydrogel Form Promotes Wound Healing Process through a Multiscale Adsorption Mechanism

UnJin Ryu, Pham Ngoc Chien, Suin Jang, Xuan-Tung Trinh, Hyeon Shin Lee, Le Thi Van Anh, Xin Rui Zhang, Nguyen Ngan Giang, Nguyen Van Long, Sun-Young Nam,* Chan Yeong Heo,* and Kyung Min Choi*

The regulation of proinflammatory mediators has been explored to promote natural healing without abnormal inflammation or autoimmune response induced by their overproduction. However, most efforts to control these mediators have relied on pharmacological substances that are directly engaged in biological cycles. It is believed that functional porous materials removing target mediators provide a new way to promote the healing process using their adsorption mechanisms. In this study, the Zr-based metal-organic frameworks (MOF)-808 ($\text{Zr}_6\text{O}_4(\text{OH})_4(\text{BTC})_2(\text{HCOO})_6$) crystals are found to be effective at removing proinflammatory mediators, such as nitric oxide (NO), cytokines, and reactive oxygen species (ROS) in vitro and in vivo, because of their porous structure and surface affinity. The MOF-808 crystals are applied to an in vivo skin wound model as a hydrogel dispersion. Hydrogel containing 0.2 wt% MOF-808 crystals shows significant improvement in terms of wound healing efficacy and quality over the corresponding control. It is also proven that the mode of action is to remove the proinflammatory mediators in vivo. Moreover, the application of MOF-808-containing hydrogels promotes cell activation, proliferation and inhibits chronic inflammation, leading to increased wound healing quality. These findings suggest that Zr-based MOFs may be a promising drug-free solution for skin problems related to proinflammatory mediators.

1. Introduction

Cytokines, reactive oxygen species (ROS),^[1–9] and nitric oxide (NO) are important proinflammatory mediators involved in the wound healing process in multiple-size regimes.^[10–13] Manipulation of these multiscale mediators has been shown to play an important role in promoting the wound healing process.^[1,2,10–15] While the mediators are necessary, their overproduction makes the healing process slow and often leads to abnormal inflammation and autoimmune response. Specifically, excess production of cytokines causes tissue damage, cellular injury, and chronic inflammation and, in severe cases, can also induce a cytokine storm.^[12] Moreover, the excess production of nitric oxide and ROS can lead to oxidative stress, inducing cell toxicity and DNA damage. Furthermore, the excess amount of ROS hinders fibroblast migration and proliferation during the generation of the dermal skin layer.^[16,17] Thus, there is a need for a strategy to control the mediators and thus promote the

Effect of Silicone Patch Containing Metal-organic Framework on Hypertrophic Scar Suppression

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Abstract. Background/Aim: Hypertrophic scars (HS) are an abnormal cutaneous condition of wound healing characterized by excessive fibrosis and disrupted collagen deposition. This study assessed the potential of a silicone patch embedded with chemically stable zirconium-based metal-organic frameworks (MOF)-808 structures to mitigate HS formation using a rabbit ear model. Materials and Methods: A silicone patch was strategically engineered by incorporating Zr-MOF-808, a composite structure comprising metal ions and organic ligands. Structural integrity of the Zr-MOF-808 silicone patch was validated using scanning electron microscopy and X-ray diffraction analysis. The animals were divided into three groups: a control, no treatment group (Group 1), a silicone

patch treatment group (Group 2), and a group treated with a 0.2% loaded Zr-MOF-808 silicone patch (Group 3). HS suppression effects were quantified using scar elevation index (SEI), dorsal skin thickness measurements, and myofibroblast protein expression. Results: Histopathological examination of post-treatment HS samples revealed substantial reductions in SEI (34.6%) and epidermal thickness (49.5%) in Group 3. Scar hyperplasia was significantly diminished by 53.5% ($p < 0.05$), while collagen density declined by 15.7% in Group 3 compared to Group 1. Western blot analysis of protein markers, including TGF- β 1, collagen-1, and α -SMA, exhibited diminished levels by 8.8%, 12%, and 21.3%, respectively, in Group 3, and substantially higher levels by 21.9%, 27%, and 39.9%, respectively, in Group 2. On the 35th day post-wound generation, Zr-MOF-808-treated models exhibited smoother, less conspicuous, and flatter scars. Conclusion: Zr-MOF-808-loaded silicone patch reduced HS formation in rabbit ear models by inducing the proliferation and remodeling of the wound healing process.

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Key Words: Hypertrophic scar, silicone patch, metal-organic frameworks (MOF), Zr-MOF-808, transforming growth factor β 1 (TGF- β 1), alpha-smooth muscle actin (α -SMA), myofibroblasts.



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