



Tissue engineering & Regenerative Medicine, Bio-Fabrication

*Innovative company to be a leader  
in regenerative medicine*

Dec. 2024

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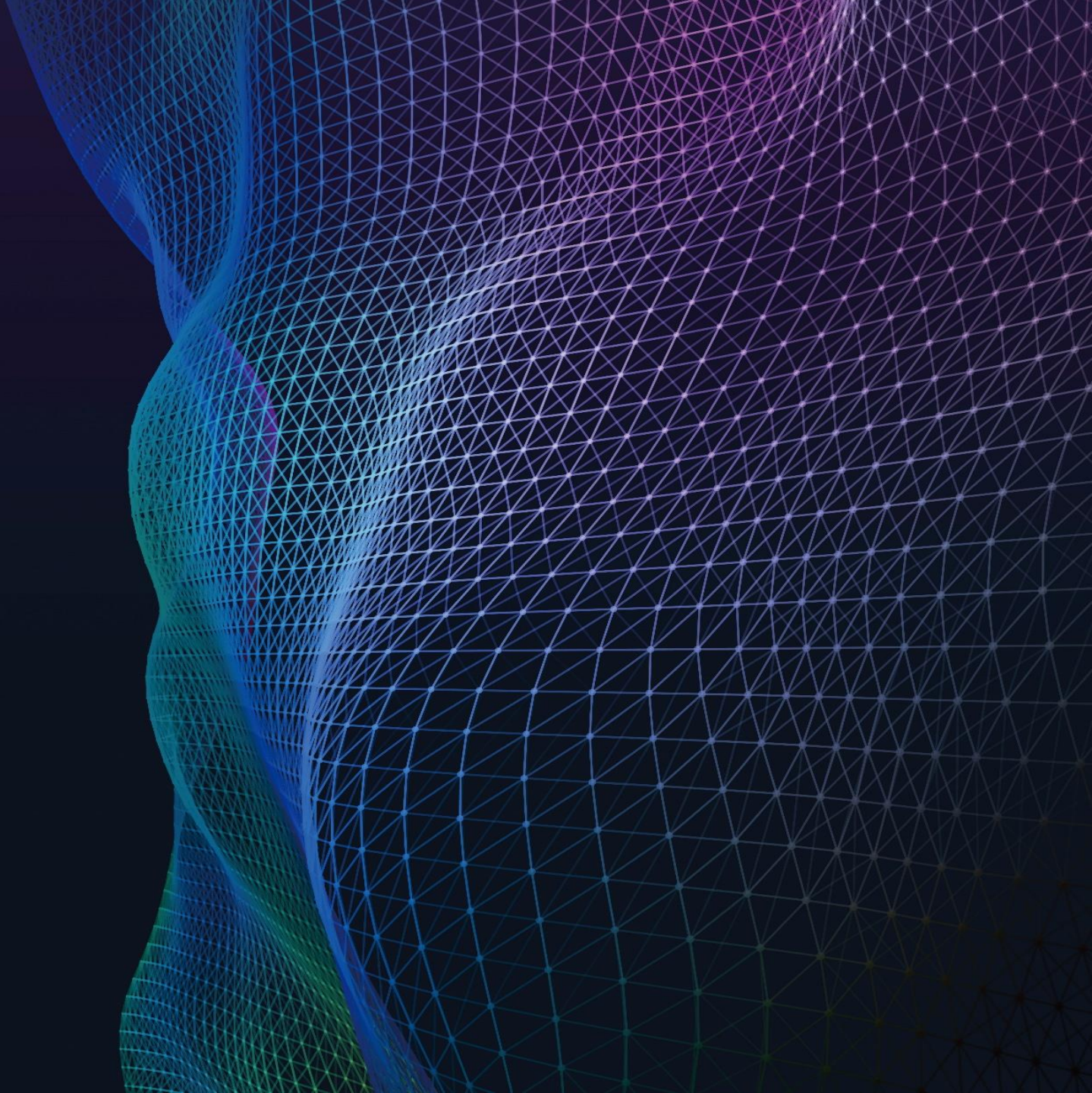
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# Part 00. Introduction

01. Introduction

02. Business Domain

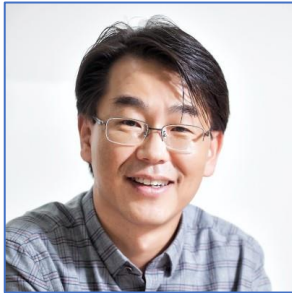




## Tissue Engineering & Regenerative Medicine, Biofabrication

Founded by **the best Engineers** in 2013

Prof. Yun



Prof. Shim



Prof. Cho



### “Bench to Bedside”

Applying the research results to actual clinical practice.

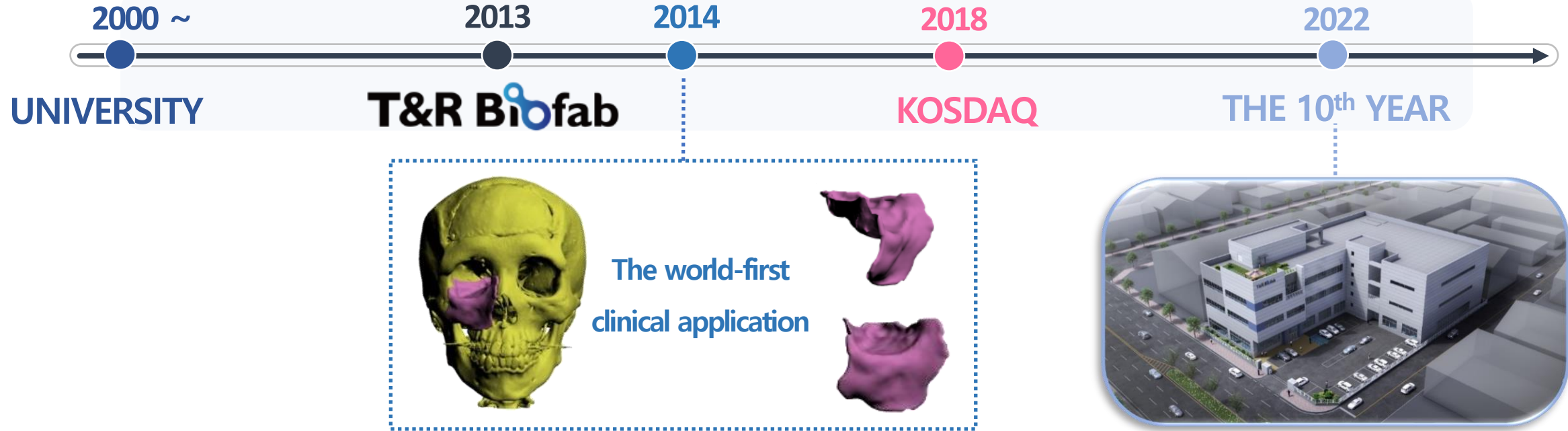


### “Global leading company in regenerative medicine”



# Foundation and key numbers

**T&R Biofab**



**171**  
Patents

**15M \$**  
Grants

**80M USD**  
Fundraise

**100**  
Employees

**> 80,000**  
Patients



## 3D Bioprinting Platform

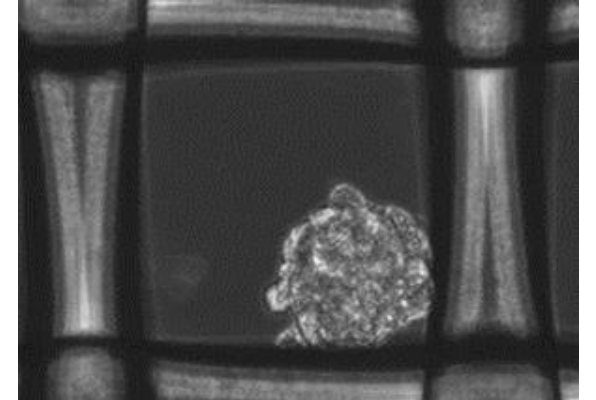
- Original technology
- 15+ years of 3D printing know-how
- Customized 3D bioprinting system
  - Hardware
  - Software



## Biomaterials

- Bio-polymers
  - Absorbable (PCL, HA)
  - Non-absorbable (Polyurethane)
- Bioink
- Extracellular matrix (ECM)

PCL: Polycaprolactone  
HA: Hyaluronic acid



## Stem Cells

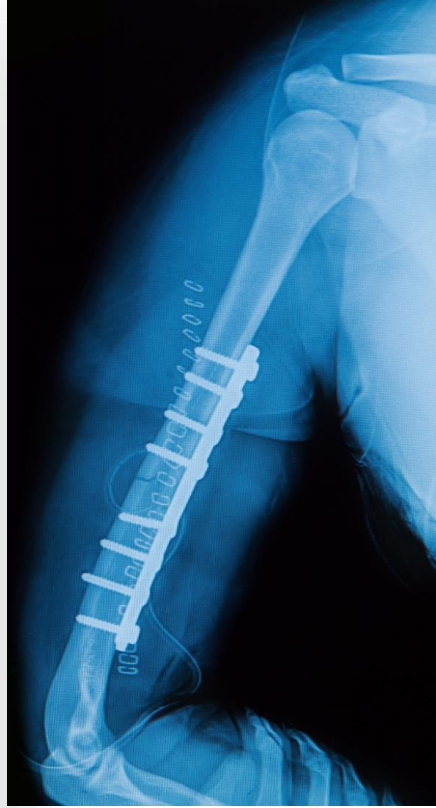
- Induced pluripotent stem cells
- Autologous cells



### **Lifecare Medical Devices**

PU wound dressing  
Hydrocolloid spot patch  
HA solidified cosmetics

**Shortterm Cash Cow**



### **Printed Medical Devices**

Bone Support Scaffolds  
Patient-specific  
Off-the-shelf

**Midterm Cash Cow**



### **Biosurgical Solutions**

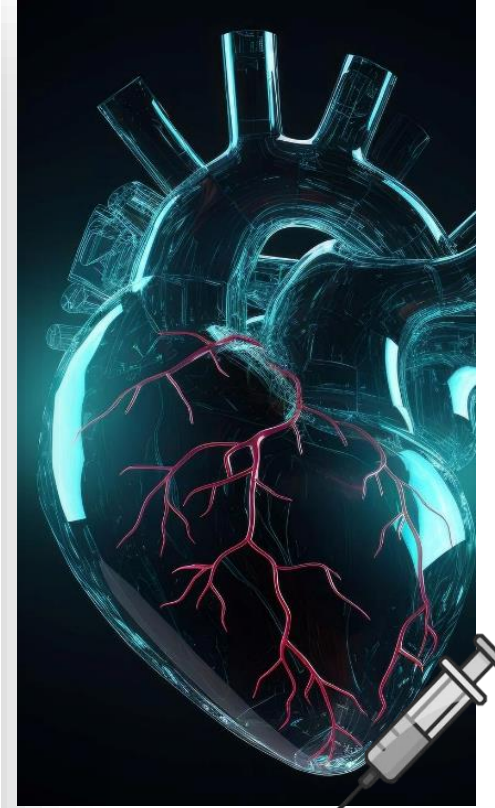
Wound healing products  
ADM, Hemostatic agents,  
Adhesion barrier  
Biomaterial-based products



### **Mini-tissues & Organoids**

In-vitro skin modelling  
Drug screening  
Skin & Liver tissues

**Longterm innovation**



### **Transplantable organ & Cell Therapy**

World first organ  
transplantation  
Heart failure therapy





## Part 01. Innovative 3D Bioprinted Tissue/Organ

- 1. World first transplantation of 3D organ
- 2. Skin & Liver Organoids

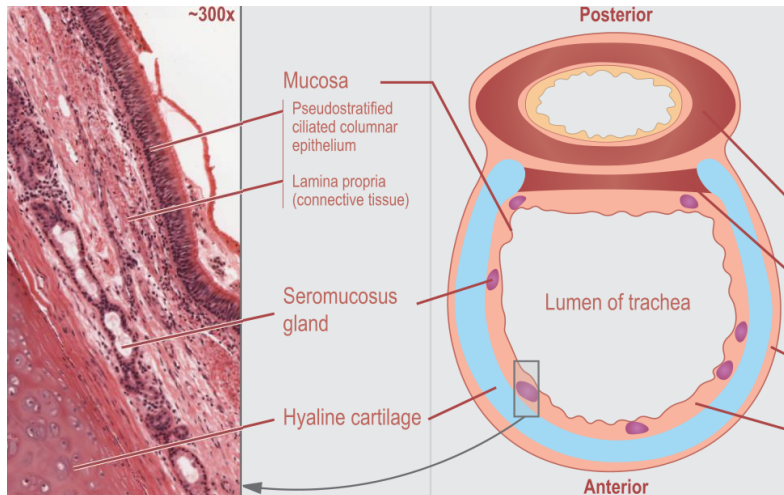


# 1. World First Transplantable 3D Organ -Trachea

## “The World First 3D Biprinted Trachea Organ Transplantation in Human (2023. Aug) ”



3D Biprinted trachea tissue for reconstruction of tracheotomy



Nature of trachea



Clinical application in 2023



### Woman given a new 3D-printed windpipe in a world-first

A cutting-edge procedure in Korea has used other peoples' stem cells to design a tailor-made artificial windpipe.

[Try 3 issues for £5 when you subscribe to BBC Science Focus Magazine!](#)

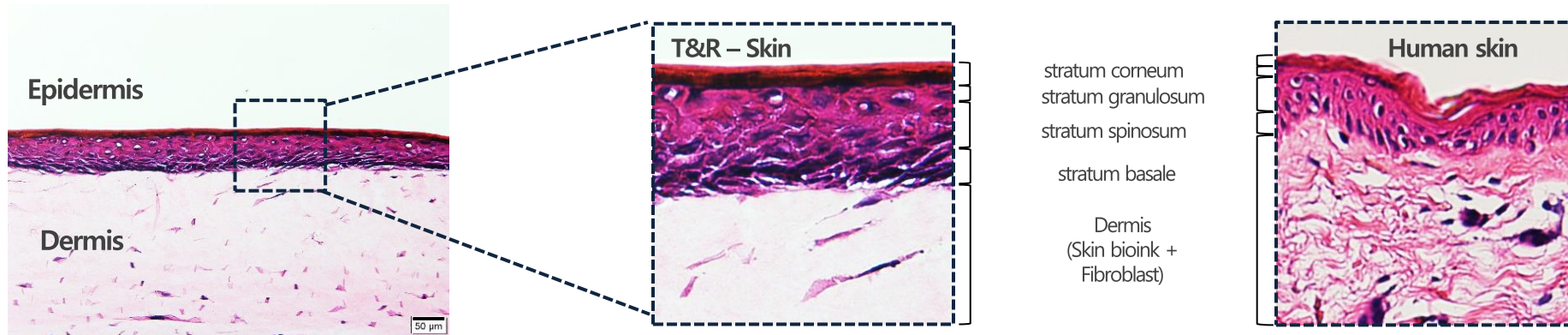


Photo credit: T&R Biofab

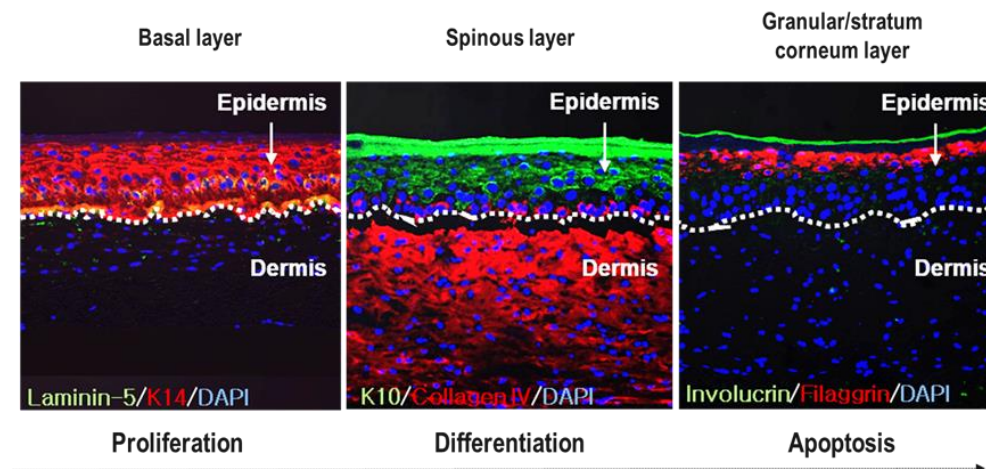
## 2. 3D Bio-printed Organoid - Skin

### “Full thickness skin model based on 3D hybrid bioprinting technology”

—● Development of human skin and skin disease models by combining cells, ECM, and various printing technologies ●—



- 3D printed full-thickness skin model
- In-vivo like skin consisting of both epidermis and dermis
- Cultivation after printing dermal fibroblasts and epidermal keratinocytes



- Expression of early and late differentiation markers (day 11)
- Very similar to native full-thickness skin



## 2. 3D Bio-printed Organoid- Skin

### “Advance in development through extensive collaboration”

Validation of novel materials – Model applications – Advanced new model development

#### SdECM for skin model

- Self-developed SdECM used to create skin model
- Superior performance verses natural collagen
- **Published in Acta Biomaterialia 2022 (with L’Oreal)**

#### Applications of skin model

- New material evaluation using T&R skin model with HK inno.N, C company

#### Advanced skin model

- Development of a functional skin model with COSMAX

- Sample test with Global Chemical Co. “B” under NDA

**COSMAX**  
THE SCIENCE OF KOREAN BEAUTY

**inno.N**

**L'ORÉAL**



Acta Biomaterialia  
Volume 143, 15 April 2022, Pages 100-114



Full length article

Impact of microstructure on cell behavior and tissue mechanics in collagen and dermal decellularized extra-cellular matrices

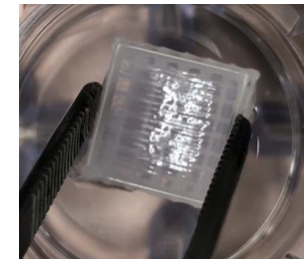
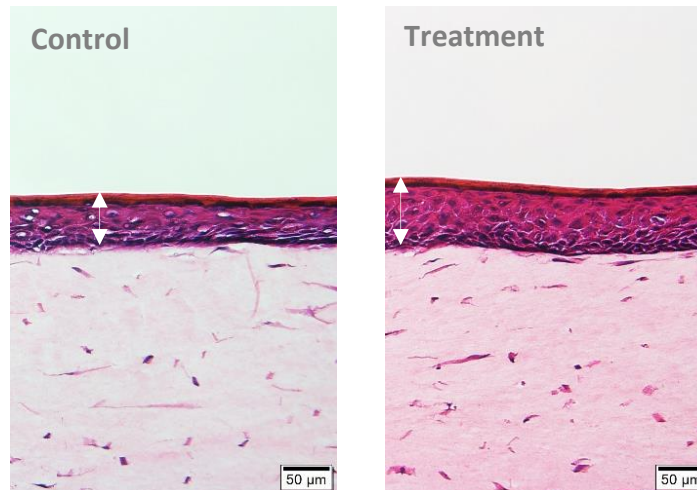
Sarah Girardeau-Hubert <sup>a</sup>, Barbara Lynch <sup>a</sup>, Francesca Zuttion <sup>a</sup>, Rabab Label <sup>a</sup>, Chrystelle Rayee <sup>a</sup>, Sébastien Brizion <sup>a</sup>, Sylvie Ricois <sup>a</sup>, Anthony Martinez <sup>a</sup>, Eunhye Park <sup>b</sup>, Changhwan Kim <sup>b</sup>, Paulo André Marinho <sup>b</sup>, Jin-Hyung Shim <sup>b, c</sup>, Songwan Jin <sup>b, c</sup>, Malté Rielland <sup>b, c, d, e</sup>, Jérémie Soeur <sup>b, c, d</sup>

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<https://doi.org/10.1016/j.actbio.2022.02.035>

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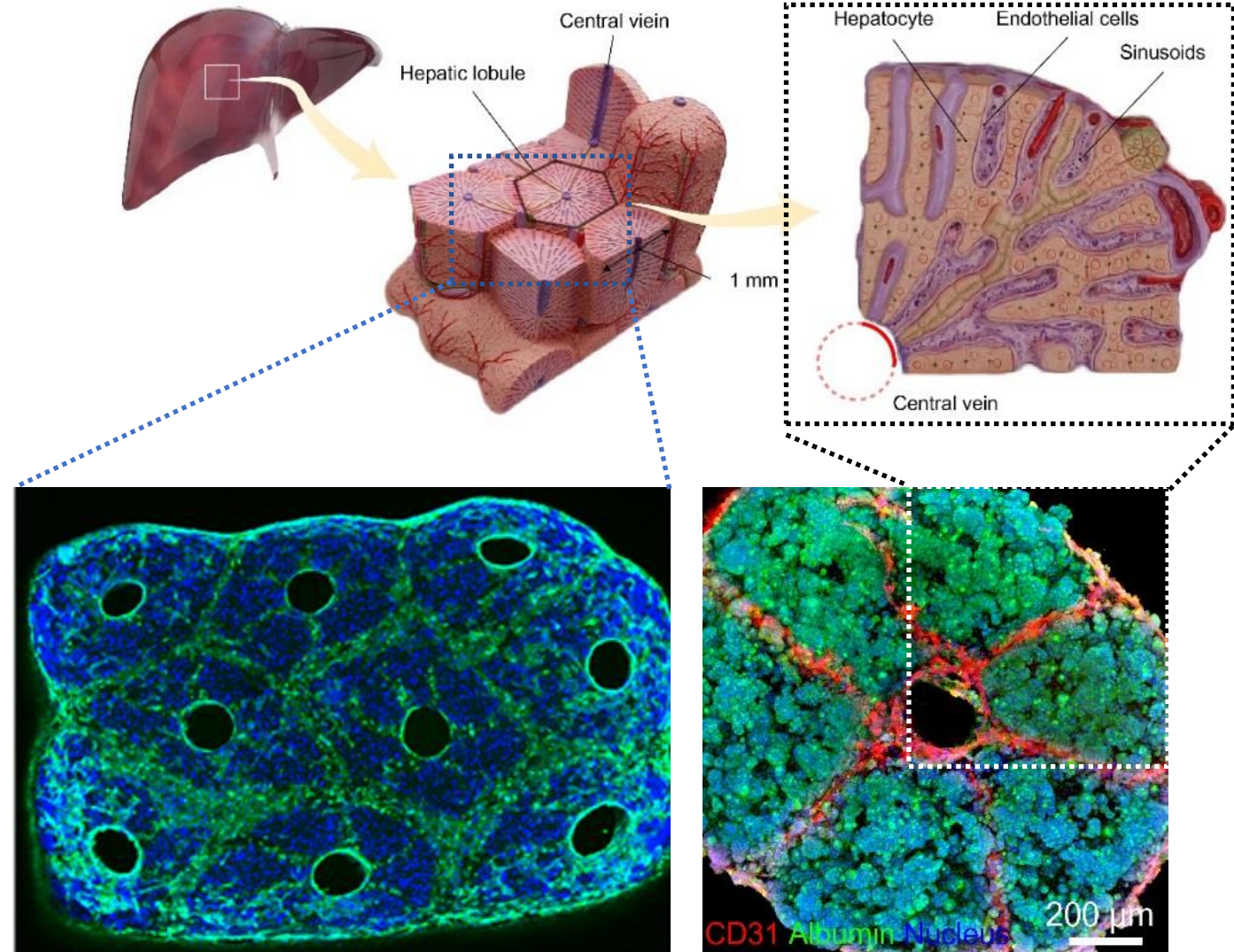
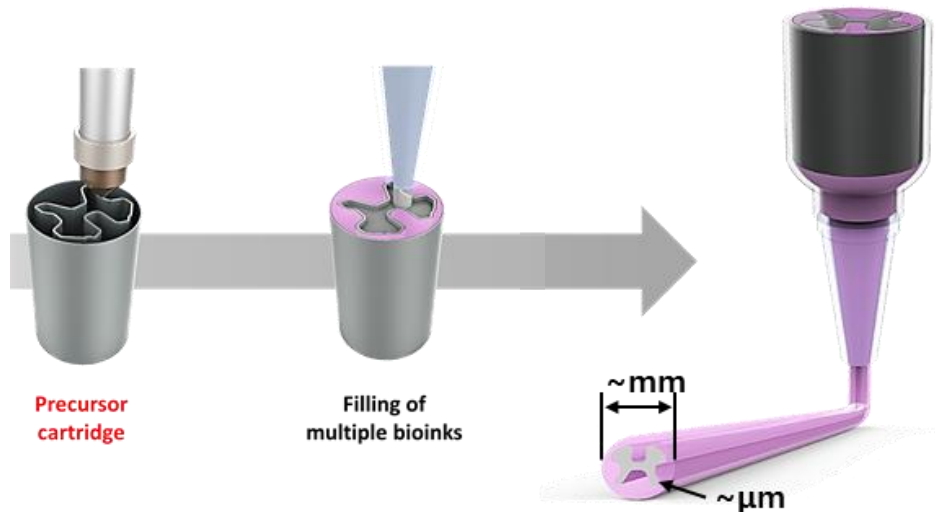
“Therapeutic bio-artificial skin”

### 3. 3D Bio-printed Organoids - Liver

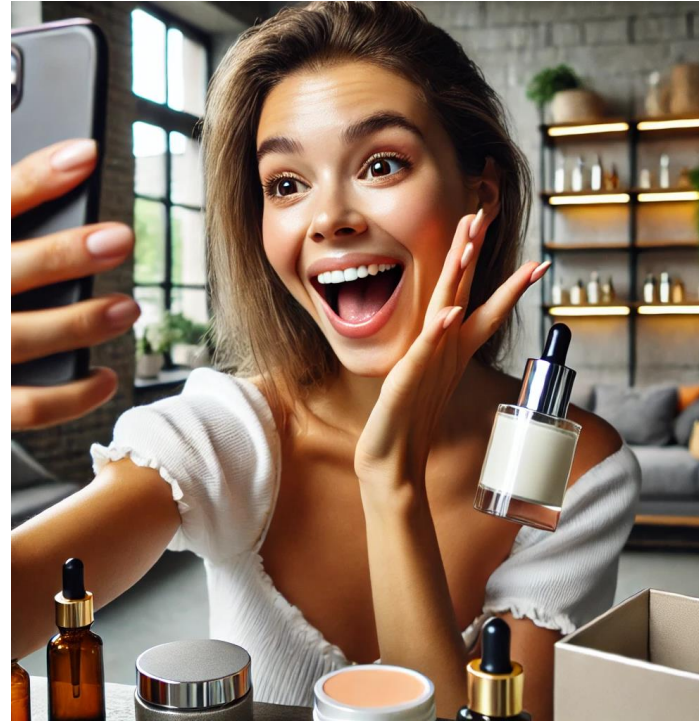
#### 3D Printed mini-liver tissue (hepatic lobule)

- Unprecedented precision of bio-printing of the globally patented **'Pre-set extrusion'** method
- Simultaneous printing of multiple materials or cells
- Printing resolution in the order of tens of micrometers
- Published in Biofabrication (IF 10.2), Small (IF 13.2), Advanced Materials (IF 30.8)

#### World-wide patented 'Pre-set extrusion' method







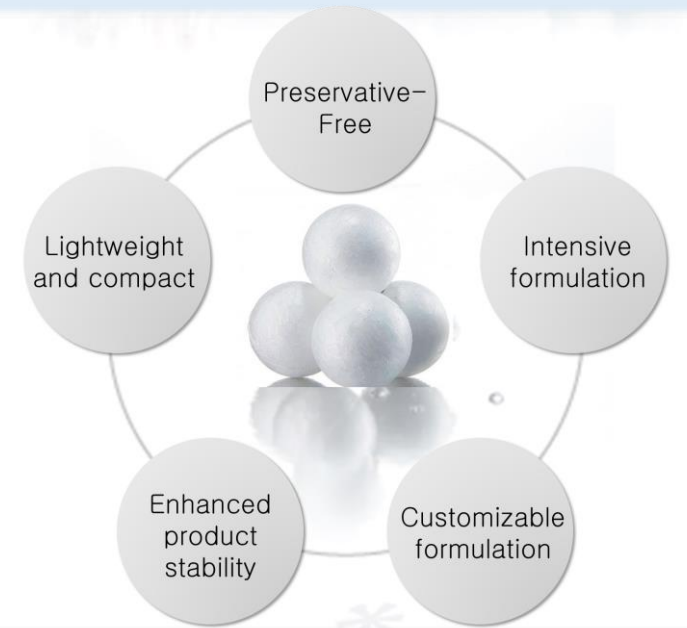
## Part 2. Short-term cash cow

- K-Beauty Cosmetics
- Lifecare products

# 01 Waterless skincare (K-Beauty Cosmetic)

T&R Biofab

## 1. Free-dried HA ball



# Waterless Skincare

The concept of waterless skincare started in South Korea and refers to products that are formulated without the use of water **to increase the potency and stability of skincare and reduce packaging and logistics footprint of the skincare industry.** Waterless beauty products can come in different forms, like powders, solids, balms, or oils.

## 2. Proprietary HA sheet (Roll-dried)





# 01 Waterless skincare (K-Beauty Cosmetic)

## Highly experienced ODM/OEM Partner for Freeze-dried Cosmetics



(T&R Biofab's subsidiary)



ARTISTRY  
Collagen Ball Gift Box  
(CHINA)



Youology 7-day vitamin C treatment  
(USA)



Infinity KOSE  
6 Days Bounce Infusing Essence  
(JAPAN)



ARTISTRY INTENSIVE SKINCARE  
VITA COLLAGEN CAPSULE  
(KOREA, EAST ASIA, EUROPE)



NOAV 3 Types Booster Shot  
(Freeze Dried ball, Korea)



Makeon  
Hyaluronic Spa Capsule  
(Amore Pacific KOREA)

T&R Biofab



D'Alba  
Pure Vitamin C 37% Premium Capsule  
(KOREA)



Cotton Seed Barrier Cleansing Ball  
(KOREA, Europe)



Dr.Jart  
Brightamin Brightening Serum  
with Niacinamide and Vitamin C  
(USA)

# 02 K-beauty waves to the world

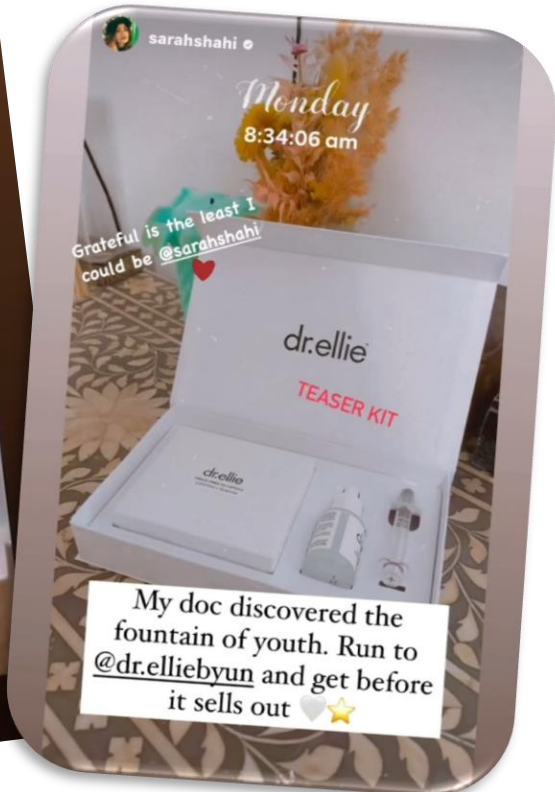
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## Global sales networks

QVC Japan home shopping



Influencer marketing in USA





# 03 Healthcare Product (Wound dressing products)

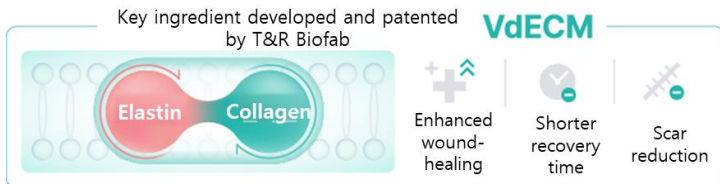
T&R Biofab

## Advanced Wound Dressing Products

### 1. Ointment type

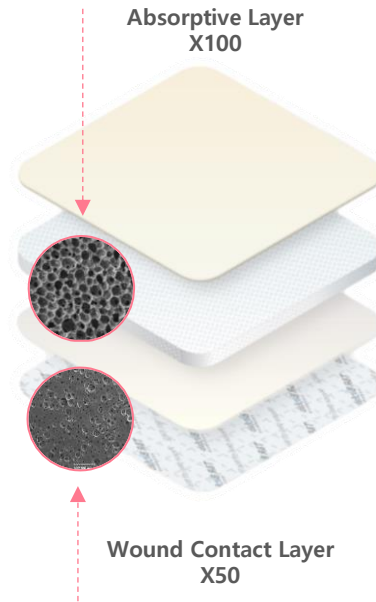


“Contain VdECM, component specializing in Tissue Regeneration”



“Wound healing + Scar reduction”

### 2. PU foam type



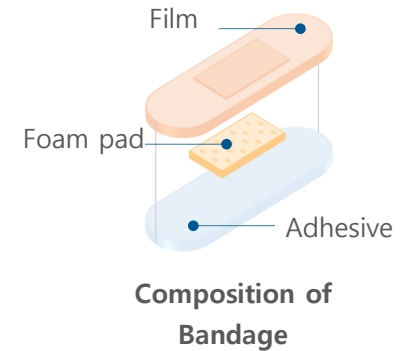
“Chlorhexidine + PU foam”

✓ Antiseptic wound healing

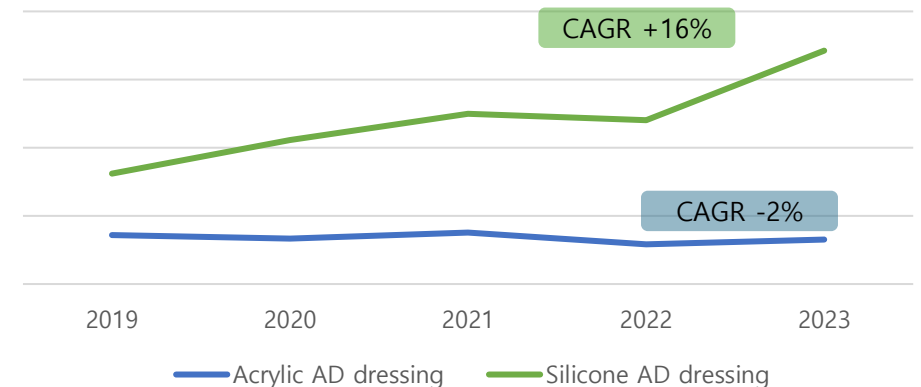
### 3. Bandage and PU hybrid type



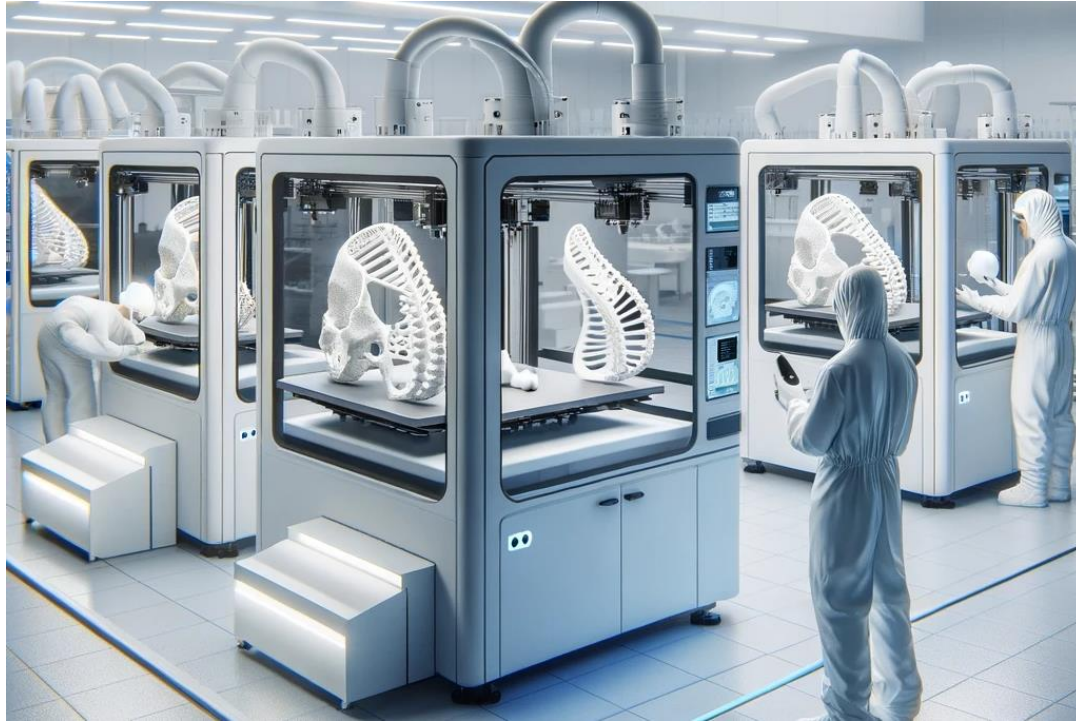
Urethane film + Silicone adhesive + PU Foam pad”



“ Market trend depending on adhesive material in ETC ”



ETC In-market data

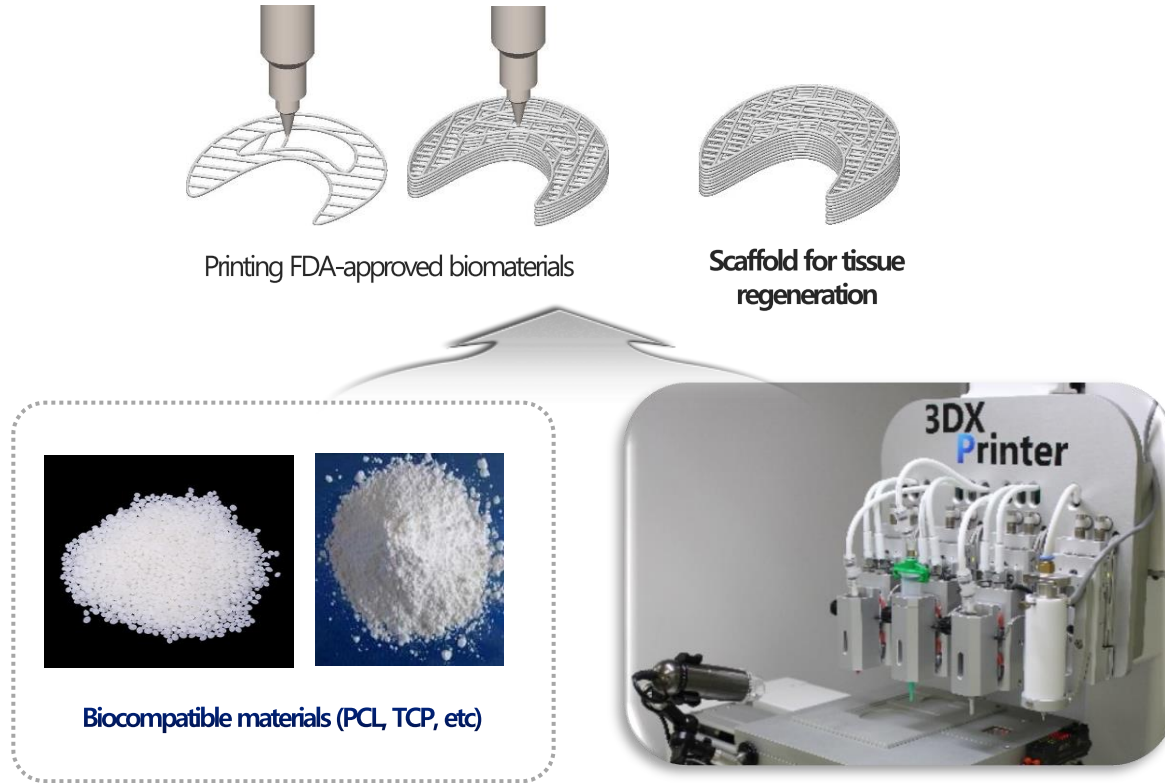


## Part 03. Midterm Cash Cow

- 3D Printed Implants
- ECM Based Bio-surgical Solutions



## 2. 3D Printed medical devices (Bioabsorbable scaffold)



### World's largest approved 3D printed medical devices provider

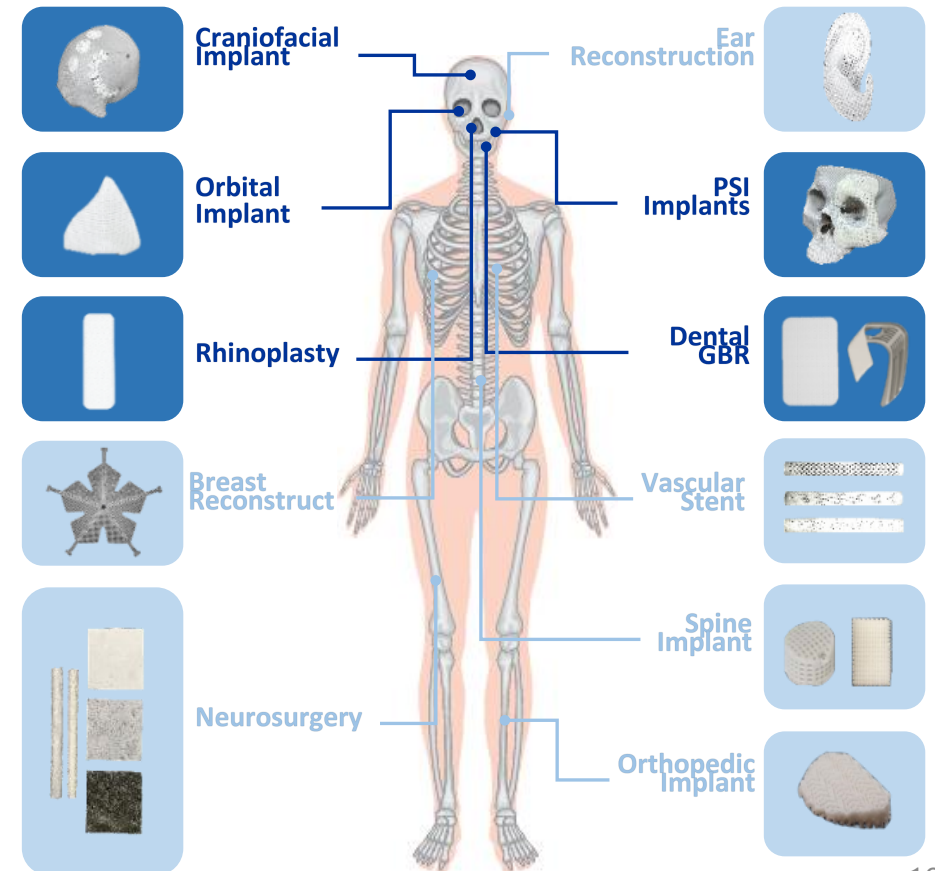
- **13 products** of class 4 medical devices (**over 13,000 specifications**)
- The largest clinical cases in the world (as of 2023 - **80,000+ cases**)
- Verified long-term follow up outcomes by **16 SCI clinical publications**

### Infrastructure in development/licensing/production/medical verification

- In the phase of **expanding indications** and **market penetration**
- **US FDA Approval will be done in 2025 4Q**

### Scaffolds for Tissue Regeneration

#### Applications



## 2. 3D Printed medical devices (Bioabsorbable scaffold)

T&R Biofab

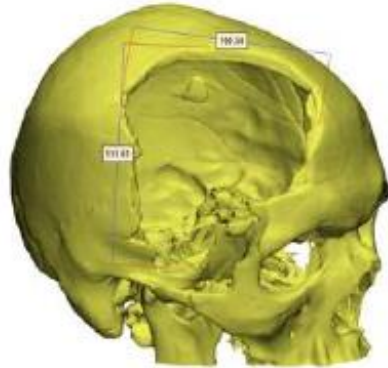
Johnson & Johnson

### Patient Specific Implant

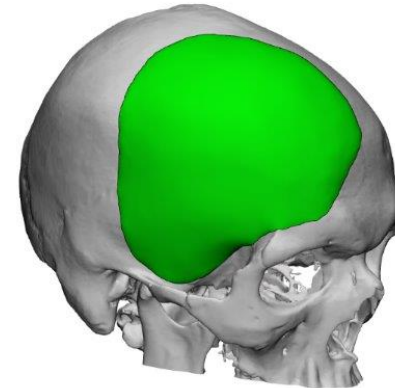
#### ✓ Clinical Application of PCL/TCP implant for Cranial Defect Reconstruction of Ukraine Army



Cranial bone defect



3D CT image



3D CAD modeling



Joaquin Duato (CEO of J&J) Visit (2022)



3D printed implant



Post-operative

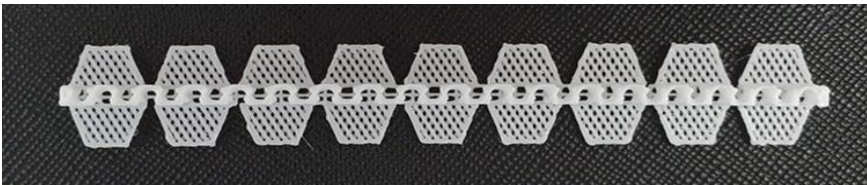


f/up CT data after 1 year

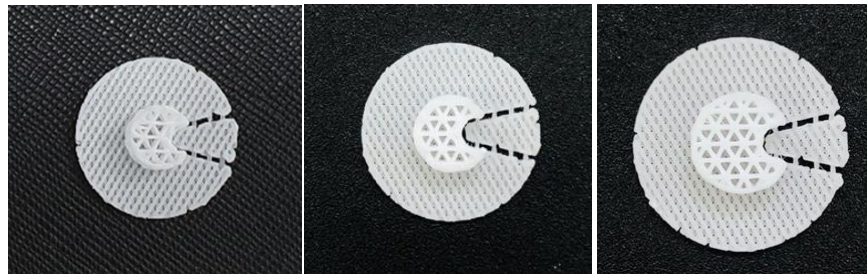


# 2-1 Business collaboration with B Braun for CMF field

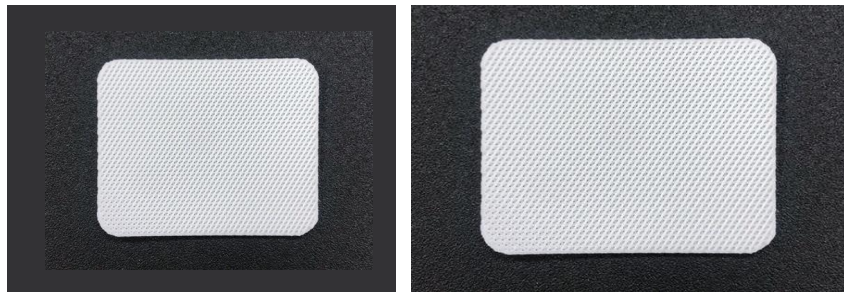
TnR Craniofacial Implant A (Gap filler)



TnR Craniofacial Implant A (EVD Cap)

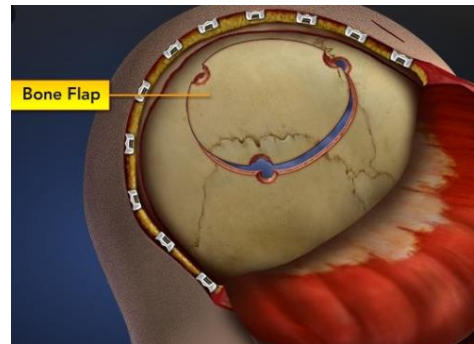


TnR Craniofacial Implant C (Plate)

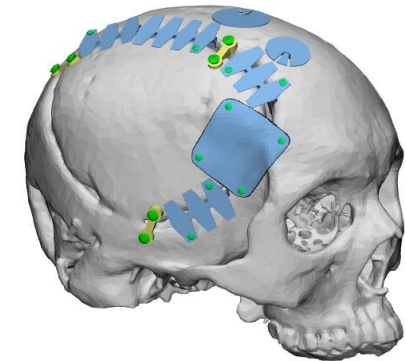


## Product Features

- ✓ Biosafety
- ✓ Effective bone healing
- ✓ Containing porous scaffold for tissue ingrowth
- ✓ Easy access to various defect



B | BRAUN



US FDA Approval will be expected to be done in 4Q of 2025

Bbraun VP of AP Visit (2023)

# 1. ECM based Bio-surgical solutions – Hemostatics

**T&R Biofab**

## Hemostatic- Matrix & Powder type

“Absorbable biomaterial products used for hemostasis in bloody site to stop it during surgical operations.”

### 1. Matrix Type



- 1 **Protective layer** – non-porous structure acts as a barrier to seal out contamination and prevent blood from leaking and to prevent tissue adhesion during healing.
- 2 **Absorbent layer** – proprietary formulation that absorbs blood and wound exudate and enacts the blood clotting process. Contains thrombin, VdECM, and in-house low-endotoxin gelatin.

### 2. Powder type



### Product Features

1. VdECM facilitates rapid tissue healing
2. Essential raw materials like gelatin and vdECM are prepared by proprietary processing technology
3. Excellent hemostatic performance compared to existing hemostatic agents in the market

**“Scheduled to be released in the first half of 2025”**

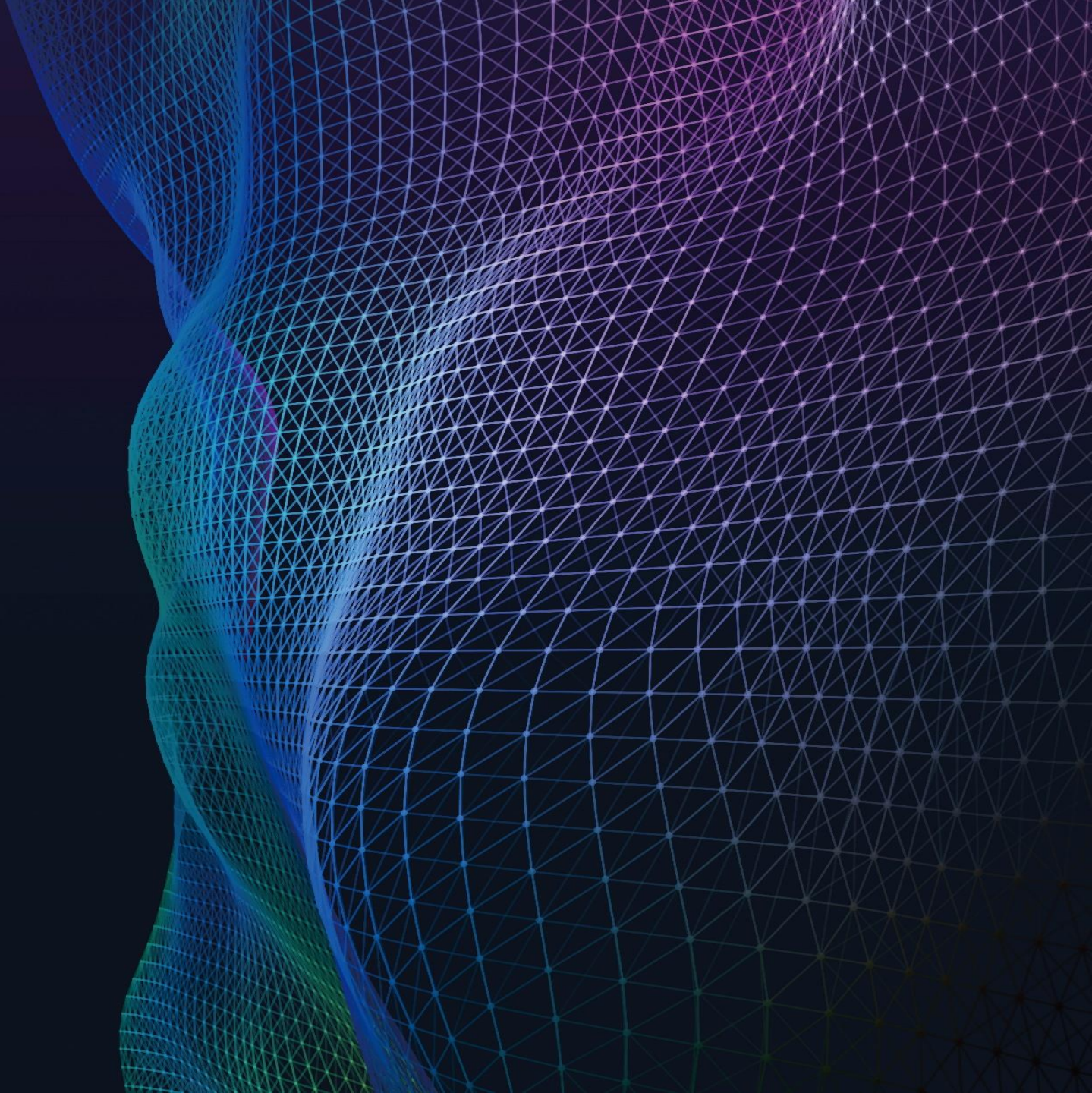
**FORTUNE**  
BUSINESS INSIGHTS

**Hemostatic Agents Market to reach US\$ 5,441.5 Mn by 2025, at a CAGR of 6.4% | Exclusive Report by Fortune Business Insights**

Key companies covered in the Hemostatic Agents Market report include Baxter, Stryker, CryoLife Inc., Integra Life Sciences, BD, Ethicon LLC., Pfizer Inc., Medtronic, Biom'up, and others



**“Take home message  
about T&R Biofab”**



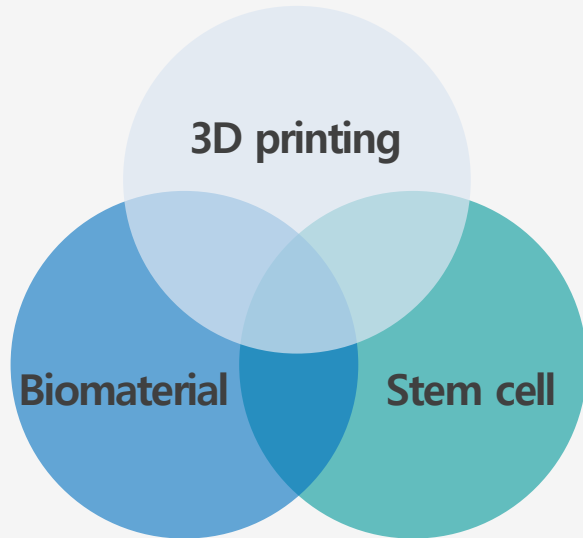


# "Key Competitiveness of T&R Biofab"

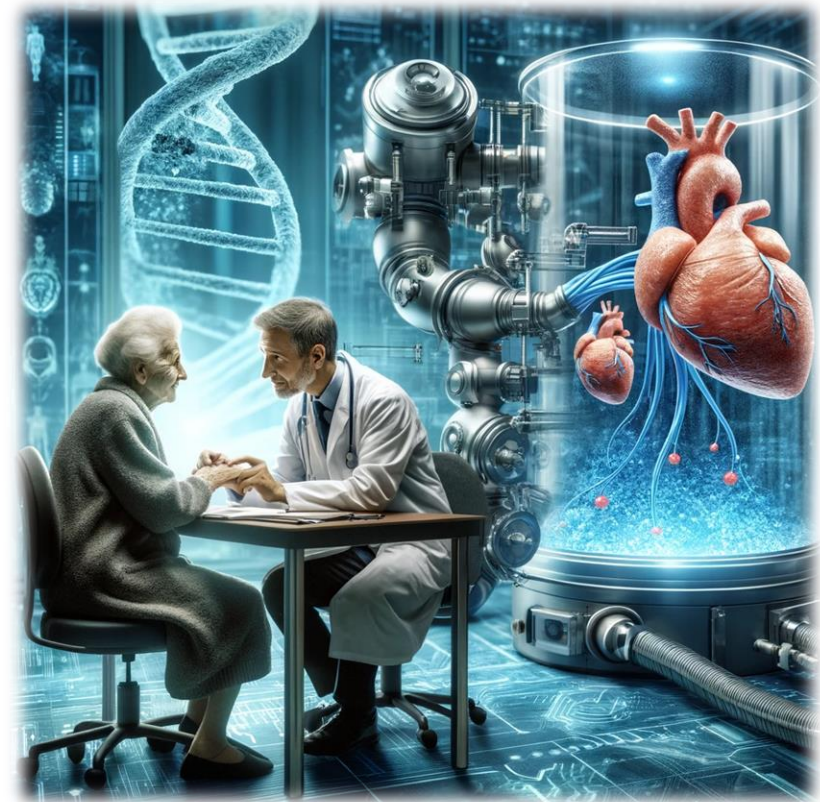
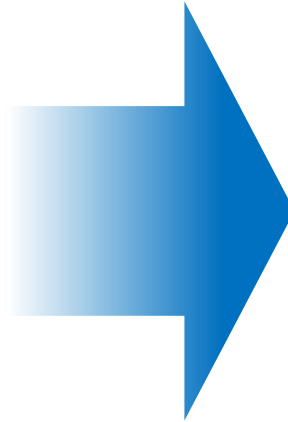
T&R Biofab

*"Innovative company to be a leader in regenerative medicine"*

"Integrative core technology"



- Translational experience from Technology to Product
- Mass producible manufacturing facility for RM field
- Achievement of world's first clinical application
- Reliable clinical data



*"Era where human tissues and organs can be artificially produced has come!!"*

*"Don't miss the opportunity to be on board"*



(주)티앤알바이오팜

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