ONS BIO

ROKIT HEALTHCARE

Dr. INVIVO 4D6 Launching Webinar

Session 1. Introducing "Organ Regenerator" Dr. INVIVO 4D6 :

Taking Bioprinting Beyond Lab to Life

Session 2. On-Demand Era of Human Tissue Research :

Bioprinted Skin **Equivalents**

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Integrate, Customize and Make Accessible: Bioprinting is Medicine's Next Frontier

ROKIT HEALTHCARE

This webinar introduces ROKIT Healthcare's state-of-the-art 4D bioprinting system Dr. INVIVO 4D6, the world's first of its kind to combine a cell incubator with a 6-printhead multi-material fabrication capability and a complete particle control. The webinar shares the vision behind the Dr. INVIVO 4D6 development, from creating novel personalized medicines based on bioprinting to revolutionizing the healthcare supply chain through in-hospital manufacturing.

ABOUT PRESENTER

Mr. Xia Park

Bio-Consultant
Manager, Global Business Development
ROKIT Healthcare

Park is in charge of business development and overseas sales for the dissemination and propagation of service platforms that bring together 4D bioprinting technologies, computer-aided design and human biomaterials to offer breakthrough research and medical solutions.

Dr. INVIVO 4D6

INTRODUCING THE WORLD'S FIRST ORGAN REGENERATOR

PRESENTED BY ROKIT HEALTHCARE

Changing the world by serving patients through **personalized** **regenerative** therapeutics

Xia Park

Global Business Development Manager

PRINTING THE FUTURE

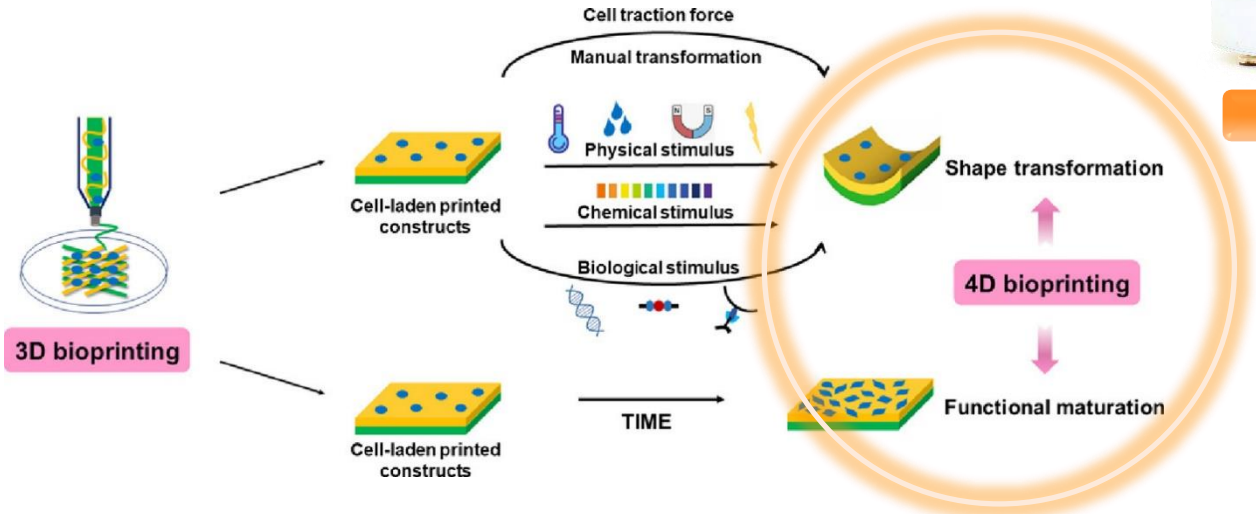
TRADITIONAL 3D BIOPRINTING TECHNOLOGY

THE PRACTICE OF USING 3D PRINTING TECHNOLOGY TO **GENERATE ORGANIC CELL STRUCTURES,** WHICH MAKES IT POSSIBLE TO PRINT **FUNCTIONAL TISSUE** THAT CAN BE USED IN **MEDICAL RESEARCH,** OR **TRANSPLANT PURPOSES.**

PARADIGM SHIFT - 4D BIOPRINTING

- THE ONLY WAY TO PRECISELY **MIMIC THE NATIVE STRUCTURE** OF TARGETED TISSUES AND ORGANS.
- BROUGHT A NEW PARADIGM IN REGENERATIVE MEDICINE & THERAPEUTIC MEDICAL FIELD.
- ROKIT HEALTHCARE'S **DR. INVIVO 4D** HAS ALREADY ENTERED THE OPERATING ROOM TO **REGENERATE ORGANS** FOR TREATING PATIENTS SUFFERING FROM DIABETIC FOOT ULCER (DFU).

DR. INVIVO 4D

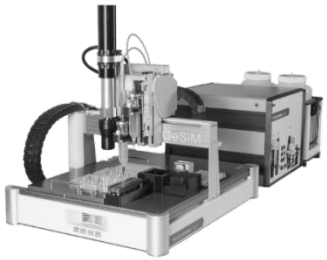


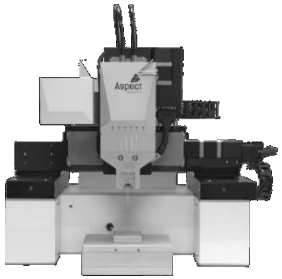
Wan, Z., Zhang, P., Liu, Y., Lv, L., & Zhou, Y. (2019). *Four-dimensional bioprinting: Current developments and applications in bone tissue engineering. Acta*

CONVERGENCE OF LABORATORIAL – MEDICAL PURPOSES

INTO THE **MEDICAL**

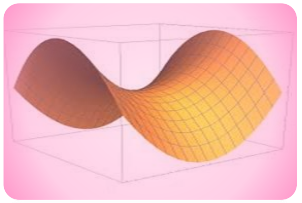
TRANSCEND THE TRADITION





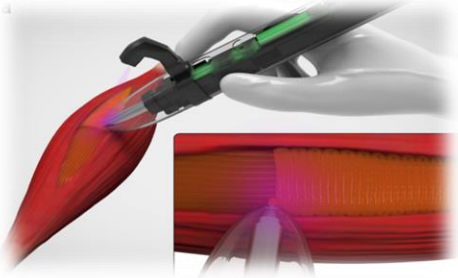
Minimum Requirements for Organ Regeneration

Requirement 1



In-situ 4D Printing

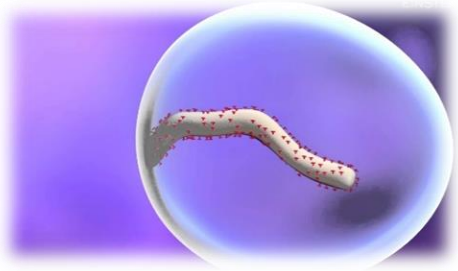
The human body is a curved surface.
The **direct application of biomaterials to a curved surface of the body to create or repair living tissues should be easy,** so you could have a rapid wound coverage and recovery.



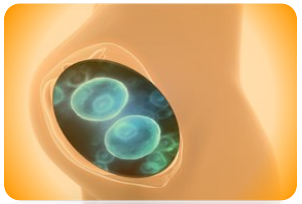
Requirement 2

Sterilization

Treating all substances as potentially infectious, the **device should be able to sterilize itself as well as implantable devices it creates**.

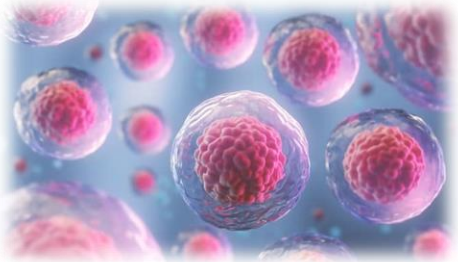


Requirement 3



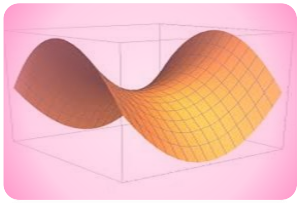
Incubation

Mammalian cells grow best at their native conditions, temperature and in vivo pH, similar to CO_2 tension in the bloodstream. High humidity prevents evaporation of growth media.
All these parameters work together for healthy cells which express proper protein profiles.



MINIMUM REQUIREMENTS

REQUIREMENT 1

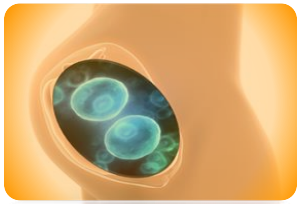


IN-SITU 4D PRINTING

REQUIREMENT 2

STERILIZATION

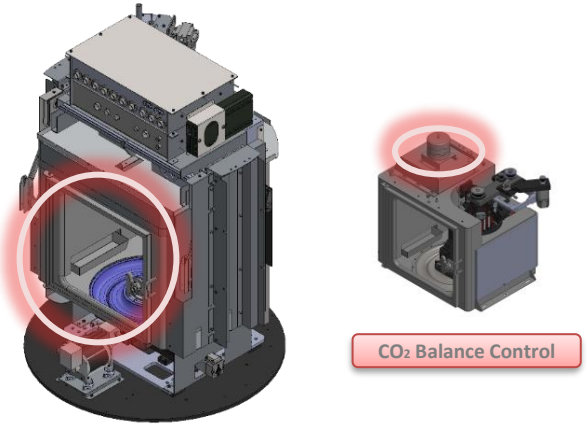
REQUIREMENT 3



INCUBATION

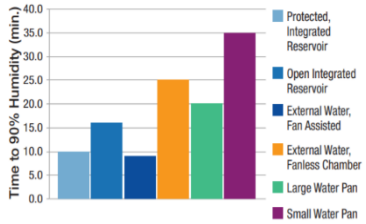
- ✓ **Dr. INVIVO 4D – The Organ Regenerator**: Z-Axis Curved Printing Technology
- ✓ **Complete Sterilization**: UV & Hepa Filter H14 w/ Hydrogen Peroxide (H_2O_2) Plasma Sterilizer
- ✓ **Optimal Incubation System**: Maintains the optimal temperature environment and CO_2 level controlled

ORGAN REGENERATOR – UNIQUE FEATURES

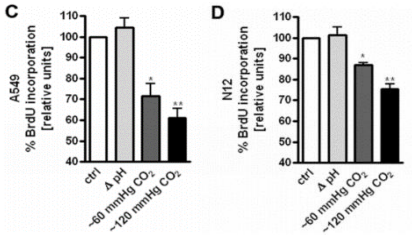


CO_2 INCUBATION CHAMBER

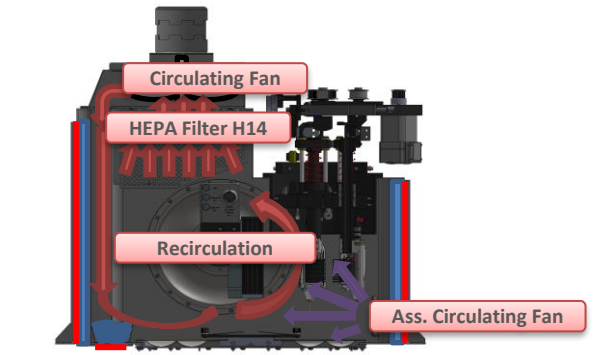
- **Maintain Optimal Environment**
  - ✓ Protect cells during printing from environmental change shock
  - ✓ Higher cell viability and contaminant-free environment
- **Specification**
  - ✓ CO_2 level : Maintain 5% of Concentration
  - ✓ Temperature : Maintain 37°C, Real Temp. up to 60°C
  - ✓ Relative Humidity : 95%
  - ✓ Natural Vaporization
  - ✓ Easily Controlled by Mobile Application



Evaporation - Humidity

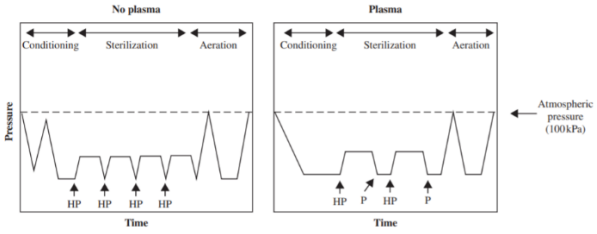


Importance of CO_2 Level



COMPLETE STERILIZATION

- **H2O2 Plasma Sterilization**
  - ✓ Low temperature sterilization method
- **HEPA Filter H14**
  - ✓ Retention rate of 99.995%
  - ✓ Laminar flow effect to minimize polluted air from entering the chamber
- **UV Sterilization - Visible LED Lamp**
  - ✓ UV-C (6W) : 200 – 280nm
  - ✓ UV-A : 315 – 405 nm

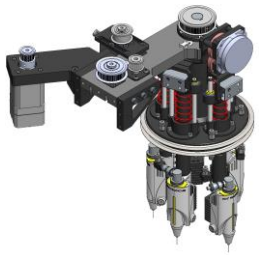


Plasma vs. No-Plasma

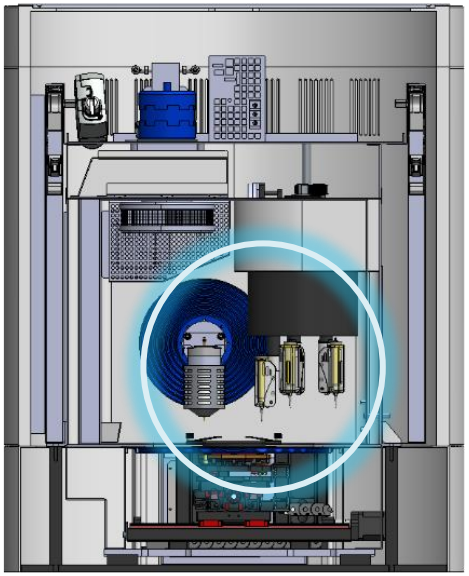
ORGAN REGENERATOR – BIOFABRICATION TECHNOLOGY

SELECTIVE PRINT MODULES

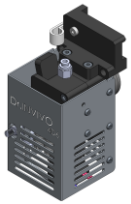
- **5 Rotary Bio-Dispensers (Medical Grade Syringe)** :
  - ✓ Easy to install
  - ✓ Able to detect its positions using central encoder
  - ✓ Pneumatic Dispensing : 0 – 10 Bar
  - ✓ Dispenser temperature range : RT – 60°C
- **1 Exchangeable Module**:



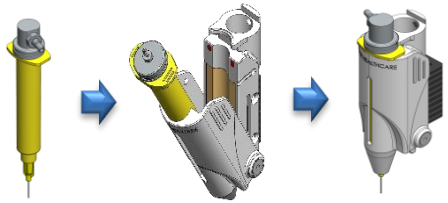
Rotary Biodispenser



Hot Melt Dispenser



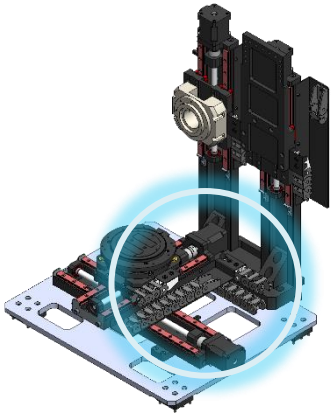
Filament Extruder



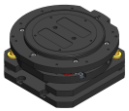
Syringe Dispenser

HIGHLY PRECISE MOTOR CONTROL

- **Auto Bed-Leveling** :
  - ✓ Ultrasonic Sensor
  - ✓ Fork Sensor
  - ✓ Photo sensor based medical linear robot
- **Print Bed & Temperature Control**:
  - ✓ Alignment achieved by fine adjust screw
  - ✓ Bed temperature range : -4 – 80°C

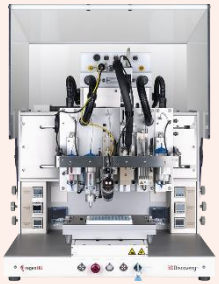


X·Y·Z axis linear motion system



Build volume of 130 x 90 x 85 (mn)

COMPETITIVENESS – DR. INVIVO 4D6

Company			ROKIT Healthcare	Supplier A	Supplier B	Supplier C
Product			Dr. INVIVO 4D6 			
Chamber System			Sterile	Open	Open	Open
Medical-Grade Standards			Medical-Grade Linear Motion System; ISO13485	X	X	X
Cell Incubator (Temperature, Humidity, CO2)			O	X	X	X
Dimension (mm)			683 x 965	836 x 623 x 773	600 x 700 x 670	500 x 360 x 450
Build Volume (mm)			80 x 80 x 80	150 x 150 x 140	130 × 90 × 60	130 x 90 x 70
Motor Resolution (μm)			10 μm	10 μm	10 μm	50 μm
Auto-Bed Leveling			O	O	O	O
Number of Printheads			6 (Built-In UV)	5	6	5 (1 for UV)
Printing & Curing Methods						
	Dispenser Temperature Control Range		4 ~ 350°C	30 ~ 250°C	30 ~ 250°C	4 ~ 250°C
	Filament Extrusion (for polymers)		O	X	O	O
	Syringe Dispensing (for hydrogel-based bioinks)		O	O	O	O
	Hot Melting Pneumatic Dispensing (for polymers)		O	X	X	X
	Bed Temperature Control		O (-4 to 80°C) Optional -30°C	O (-10 to 80°C)	X	O (4 to 60°C)
	Photo Polymerization		O (UV light = 365, 405nm) Customizable	O (UV light = 365nm)	O (UV light = 365, 520 nm)	O (UV light = 365, 405nm) Customizable
Sterilization						
	UV Germicidal Lamp		O	X	X	O
	Particle Control		Circular flow & HEPA	HEPA	X	HEPA
	Low-Temperature Plasma Sterilizer (Optional)		O	X	X	X
Technical Capabilities						
	WiFi		O	X	X	O
	Remote Monitoring (PC, Tablet)		O	O	X	O
	Mobile Phone		O	X	X	X

Thank You for Pioneering with Us

Contact Us At:

ONS BIO

Distributor of Rokit Healthcare INVIVO 4D / 4D6 bioprinters & bioinks in US

ROKIT HEALTHCARE

Organ Regeneration Platform Company

4D "Regenerator"
Human Cell-Based BioInks
Clinical Product Development

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