WWW.INNOREGEN.COM

WE CHERISH CELLS
LIKE HUMAN BEINGS

INNOREGEN2022-2023 BUSINESS CATALOG

COMPANY PROFILE | TEAM SECTION | TIMELINE
| BIOINK | OUR SERVICES | BUSINESS PLAN | PRODUCTS | PLAN

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Korea

DOWNLOAD

Brand manual
PDF Down lode http://www.inoregen.com/manual/

Details
INNOREGEN Idea

INNOREGEN

"Printing Life to Shape the Future"
Bioinks are materials used to create engineered and artificial biological tissues using a 3D bioprinter, and are made up of a combination of cells, hydrogels, and polypeptides. This ink is considered one of the most advanced tools in tissue engineering and regenerative medicine because, as a material that will become a specific biotissue or organ, it must have certain physical and mechanical properties, bio-functionality, bio-compatibility, etc. Tissue engineering and regenerative medicine has the ultimate goal of replacing damaged tissues and organs in the human body with new, functional tissues and organs composed of various cells.

Therefore, academia and industry are paying close attention to bioprinting, which may enable them to quickly realize this goal, and accordingly, the field of 'artificial organs,' in which bioprinting plays a major role, is growing rapidly. Explosive growth in the market for “bioinks” biomaterials that be printed with a 3D printer is within reach. We at INNOREGEN are attracting great attention from the entire regenerative medicine industry for successfully developing high-functional bioinks. We are the first company in Korea to work on developing bioinks that combine human-derived collagen/human-derived extracellular matrices with hydrogels.

PRINTING LIFE TO SHAPE THE FUTURE

Recent advances in 3D bioprinting and the development of bioinks provide hope that the dream of artificial organs may be realized in the fields of tissue engineering and regenerative medicine. Our ultimate goal is to produce and supply materials that can be used in the operating room to create cells, tissues and organs that can be used immediately in treating patients.

INNOREGEN, INC., develops and manufactures a variety of bioinks for 3D bioprinting. These include synthetic polymeric and tissue-derived bioinks including animal and human-derived gelatin, collagen, and extracellular matrices.

We at INNOREGEN produce and sell 3D bioinks required for research using 3D bioprinters aswell as materials for bioinks, and can supply customized inks according to the histological characteristics of the research subject. We can print biomaterials with all the necessary conditions, including usability, accuracy, printability, and stability, and are contributing to research and treatments by developing optimized inks for each cell and tissue type.

We are also committed to supporting researchers through open collaboration and contributing to the advancement of medical technologies and treatments.

At INNOREGEN, we are looking forward to supporting your research.

INNOREGEN

HISTORY of INNOREGEN

ABOUT THE PROJECT

INNOREGEN was created through the joint establishment of an institute for regenerative medicine by the U.S.-based Wake Forest Institute for Regenerative Medicine, a global leader in regenerative medicine, and Kyungpook National University Hospital.
The Institute of Regenerative Medicine at Wake Forest Medical University is considered a global leader in the field of regenerative medicine, having developed several basic principles of tissue engineering and regenerative medicine for the first time.

In addition, it is conducting initiatives with more than 400 academic groups from organizations and governmental bodies, to industry partnerships and start-ups around the world.
Based on its technology, INNOREGEN has implemented a bioink lineup aimed at healing through cell regeneration, and it was recognized for its excellent quality in biofabrication in 2016.

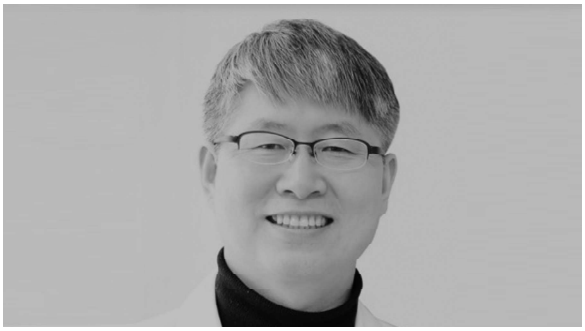
EPISODE 1 FOUNDER

I remember meeting Professor James Yoo one day in 2009. I remember that, as a scholar, he told me confidently about the future of regenerative medicine. This was the starting point for my journey along the path of regenerative medicine. While studying the diagnosis of blood disorders and transfusion medicine in hospitals, I thought about combining this field with regenerative medicine. This led me to the development of artificial bone marrow, an as-yet unrealized dream. Artificial bone marrow will one day be used as a replacement for bone marrow for patients with blood disorders who have difficulties with bone marrow transplants, and will serve as the basic framework for producing red blood cell products at an industrial level.

Jangsoo Suh

When our society becomes a super-aged society, the population of blood donors will decrease and the demand for blood transfusions will increase significantly, which may lead to constant blood supply shortages in society. If a plant can produce blood products at low cost using artificial bone marrow, this problem will be solved. Recently, as the tools of regenerative medicine are also rapidly evolving, it is expected that hospitals will begin purchasing blood products from blood plants instead of blood banks in the near future. Now, ten years later, the path to regenerative medicine, which began with the wild dream of developing artificial bone marrow, is leading towards INNOREGEN, INC.

TEAM SECTION



TEAM WORK

Team work

With a combination of four medical and academic doctors (PhDs), and 2 doctors in the field of materials, our level of team work, based on clinical studies in the development of materials, is hard to find even in peer companies around the world.

PROFESSIONAL

Professional

The combination of the technology of Wake Forest Institute for Regenerative Medicine, which has set the standards in the field of global regenerative medicine, and Kyungpook National University Institute for Regenerative Medicine, which has been showing excellent research performance, has resulted in the production of the best regenerative medical products in the world.

COMMUNICATION

Communication

Ours is a company in which practical collaboration is carried out by establishing a collaboration platform to share research ideas and achievements among startup members active in various countries.

Jangsoo Suh, CEO

Professor of Kyungpook National University

MD, PhD.

Founder of INNOREGEN

President of Kyungpook National University Bio-Medical Research Institute (2008-2010)

President of Kyungpook National University Joint Institute for Regenerative Medicine (2009-2012)

Chief Director of the Korean Society of Blood Transfusion (2008-2011)

President of Kyungpook National University School of Medicine (2012-2014)

Chairman of the Korea Society for Laboratory Hematology (2015)

Chairman of the Korean Society for Laboratory Medicine (2019)

More than 250 domestic and international academic papers (80 papers in SCI(E)) - 5 patents registered

10 academic and thesis awards received

Youngkwon Yoon, CEO

Representative President,
Yonsei Heal Rehabilitation Hospital

MD, PhD.

Former) Founder and Representative President of Yonsei Heal Rehabilitation Medicine

Full-member of the Korean Academy of Rehabilitation Medicine (2013-)

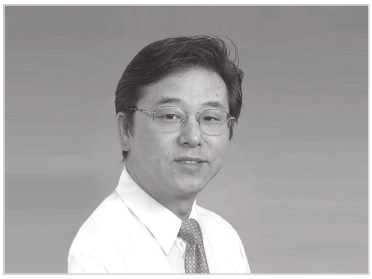
General Director of the Korean Practitioner's Association of Physical Medicine & Rehabilitation

Adjunct professor of Yonsei University (2017-)

National football team doctor for the Olympic Games in Rio (2016)

National team doctor for the FFA U-20 World Cup (2017)

Member of the Medical Division of the Korea Football Association (2019-)



James J. Yoo, Scientific Advisor

Professor, Wake Forest School of Medicine, USA

MD, PhD.

Founder of INNOREGEN

Present) Professor, Wake Forest Institute for Regenerative Medicine

Assistant Professor, Harvard Medical School, USA (2001-2003)

Associate Professor, Wake Forest School of Medicine, USA (2004-2010)

Deputy Director, Wake Forest Institute for Regenerative Medicine, USA (2009-present)

More than 250 papers in in SCI(E) - 50 or more patents registered

More than 250 guest lectures

Mentoring of 300 or more mentees

Sangjin Lee, Scientific Advisor

Professor, Wake Forest School of Medicine, USA

PhD in Biomedical Engineering

Associate Professor, Wake Forest School of Medicine, USA

Wake Forest Institute for Regenerative Medicine, USA

Moon Suk Kim, Scientific Advisor

Professor of the College of Engineering, Ajou University

Eng. D.

Served as an executive of the Korean Tissue Engineering and Regeneration Medicine Society

Served as an executive of the Korean Society for Biomaterials.

Served as Director of the Polymer Society of Korea.

Tae Gyun Kwon, Scientific Advisor

Professor of Kyungpook National University

MD, PhD.

Served as President of Gyeongbuk Regional Cancer Center

Establishment of a human-derived biomaterial development center

Youngkwon Yoon.

“ New Offices

EPISODE 2. CEO Youngkwon Yoon

It wasn't that long, but my past life was simple. All doctors will have almost the same story, but from 1999 to June 2020, when I obtained my medical license, I seem to have lived a life without rest, going through a medical student course, becoming a medical specialist by going through internship and residency programs, and the obtaining a master’s and doctorate degree with a medical specialty. After becoming a specialist, I opened my clinic with the idea of having my own brand and operated it for 8 years. While running it, I got an opportunity to be a doctor for the national football team. Such a rare chance was really valuable to me, and taking care of hundreds of thousands of patients one-on-one has always been worthwhile.

However, from some time ago, I began to wonder how I could best benefit the majority of patients. I think I had a limitation in that I had no choice but to provide conservative care while treating patients with musculoskeletal injuries for rehabilitation. I thought innovative changes were coming in the medical field, and I was confident that these changes would take place in the field of regenerative medicine. With these ideas, I joined INNOREGEN in 2018, later becoming the CEO in 2020. It‘s exciting to be in the field of the future of medicine.

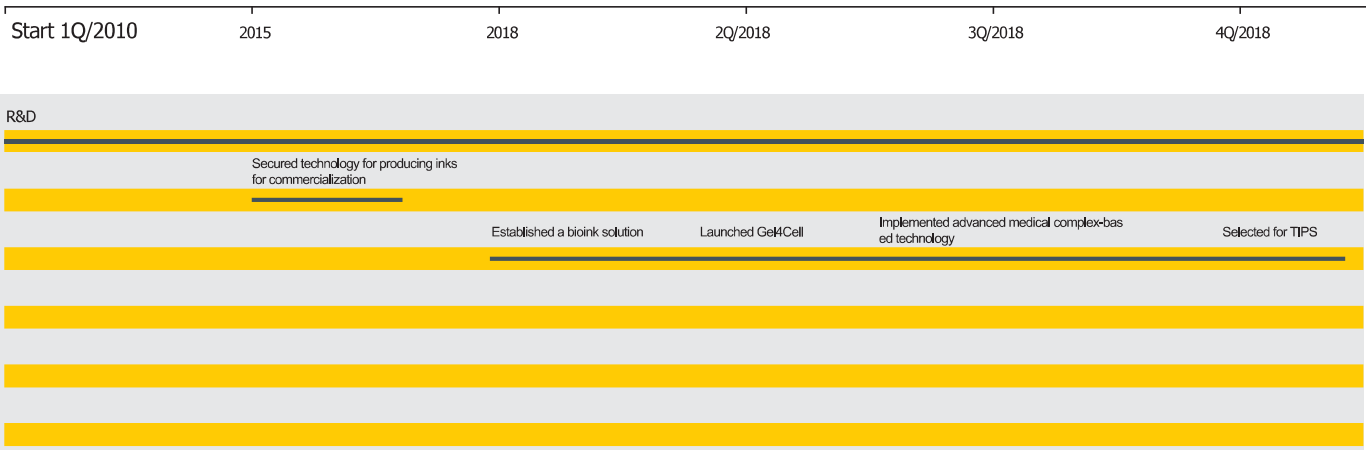
TIMELINE AND PROCESS

01

START R&D

02

FOUNDER& TECNOLOGY



2010-2015

2010 Started R&D
2010 R&D for basic research on bioinks

2015 Technology acquisition
2015 Secured the technology for producing bioinks

2018

2018 Founded
under then name of “Bioink solution” with the aim of being a leader in the fields of bioinks and tissue engineering through technology and competitiveness.

2020 Change of company name
2020 Changed the company name to "INNOREGEN INC."

2Q 3Q I 2018

2Q I 2018
Launched a gelatin-based bioink (Gel4Cell)

3Q I 2018
- Launched a bioink (Gel4Cell-Peptides)
- Selected as a high-tech medical complex-based technology construction company
- Selected as a leading university business for commercializing a startup item.
- Mentoring project selected

4Q I 2018

4Q I 2018
- Registered the original patent for the core bioink
- Selected for a 2018 medical qualification and employment support project
- MOU with Daegu Gyeongbuk Advanced Medical Device Development Support Center
- MOU with Kyungpook National University Human Body Resource Bank
- Selected for the private investment-led Tech Incubator Program forSstartups (TIPS)

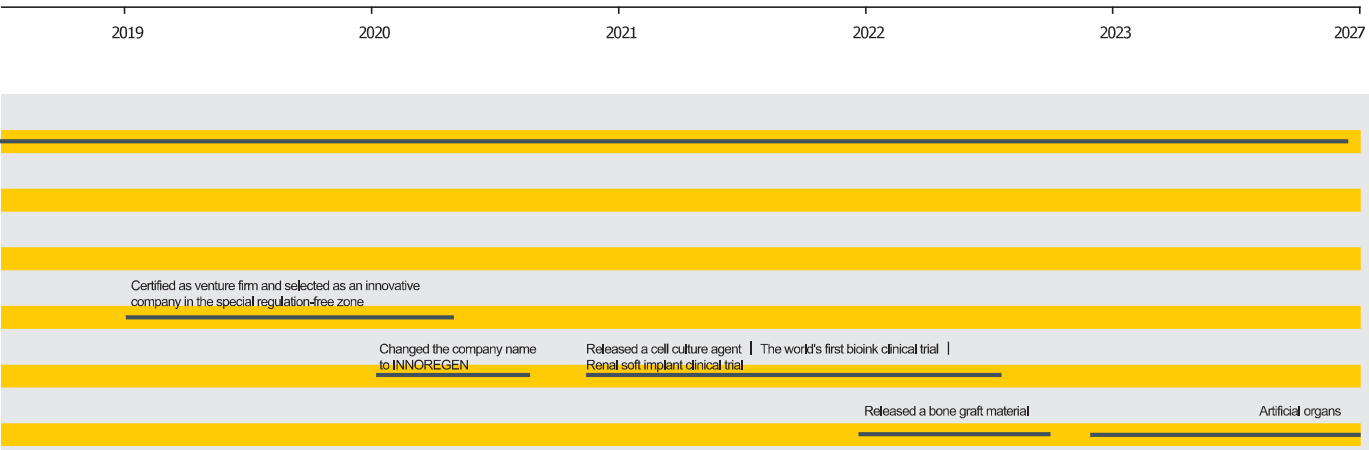
03

PRODUCT OF INNOREGEN

-

04

INVESTMENT AND RECOGNITION



1Q 2Q | 2019

1Q | 2019
-Certified as venture firm
-Upgraded the Gel4Cell and Peptides bioinks

2Q | 2019
-Selected for a 2019 medical qualification and employment support project
-Company-affiliated research institute certified
-MOU with Ajou University
-Selected for a funding project for TIPS startup commercialization

3Q 4Q | 2019

3Q 4Q | 2019
-Selected for the 2019 regional economic innovation capacity building project
-Selected as an innovative company in the special regulation-free zone
-Established a satellite research institute

4Q | 2019
Selected a as U-Tech Valley company

2020

2020
Secured 3D tissues, organ regeneration and treatment technology.

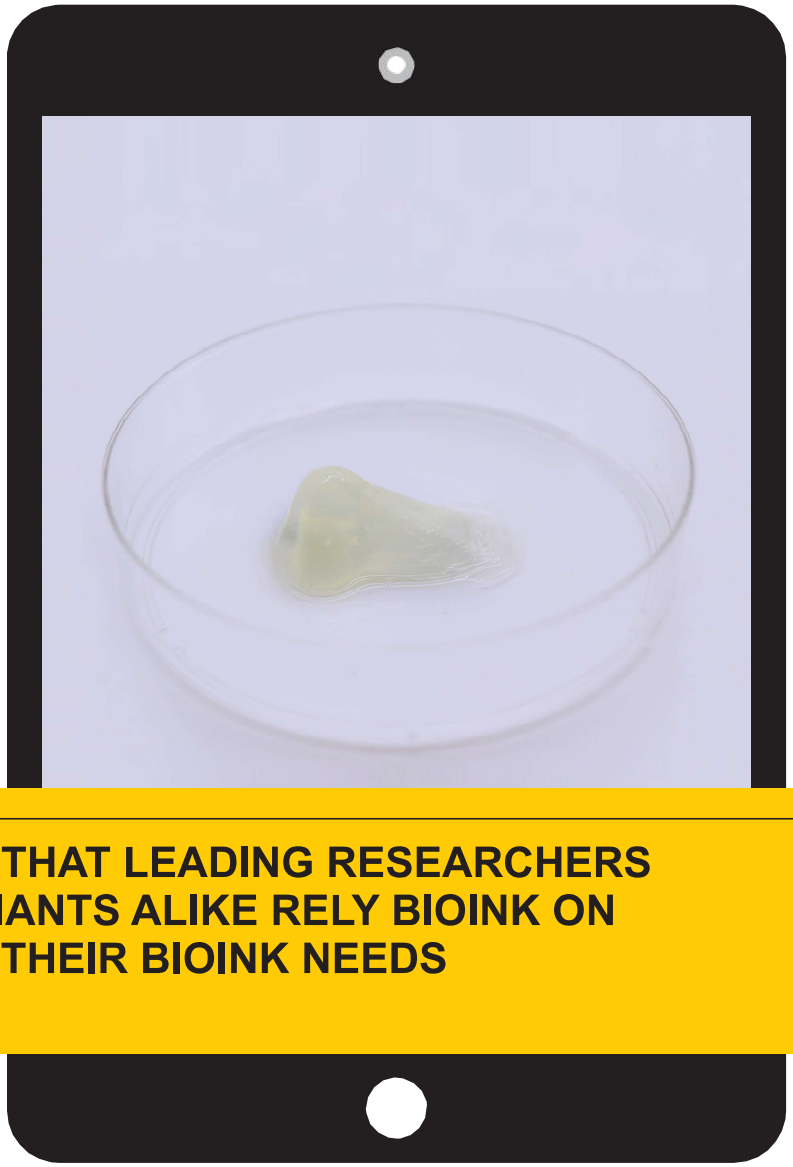
2020 Change of company name
2020 Changed the company name to "INNOREGEN INC."

1Q 3Q

1Q | 2020
-Released a collagen-based bioink (Col4Cell)

3Q | 2020
-Launched a bioink (Col4Cell-Peptides)

WHAT IS BIOINK



IT'S NO WONDER THAT LEADING RESEARCHERS AND INDUSTRY GIANTS ALIKE RELY BIOINK ON INNOREGEN FOR THEIR BIOINK NEEDS

WHY INNOREGEN BIOINK

-

We have been conducting thorough testing for a long time to create the desired human body structures while maintaining the best cell viability, and have achieved remarkable technology which can deliver several factors that make up cells and the human body while maintaining safe and optimal viability and environment through more than 10 years of research.

TECHNOLOGICAL SUPERIORITY OF BIOINK

-

INNOREGEN's technology is optimized both for hard structures like bones and for soft tissues like the brain and various other organs. It can also print any tissue in between. Our research team has characterized bioinks in order to develop inks that can guarantee batches and consistent results during bioprinting.

OUR DEDICATED TEAM OF BIOENGINEERS CHARACTIZES EVERY BIOINK TO ENSURE CONSISTENT RESULTS WHILE BIOPRINTING.

OUR SERVICE

WE CHERISH CELLS LIKE HUMAN BEINGS

BEST INNOREGEN SERVICE

In order to print living cells, bioinks that take into account the environment suitable for living cells, biodegradability to secure cell growth space, physical properties for printing, and mechanical properties suited to the application are essential.

INNOREGEN supplies tissues with living cells customized to numerous researchers in the relevant fields, and they can be custom produced to the research purpose, research field, and research subject.

Bioinks

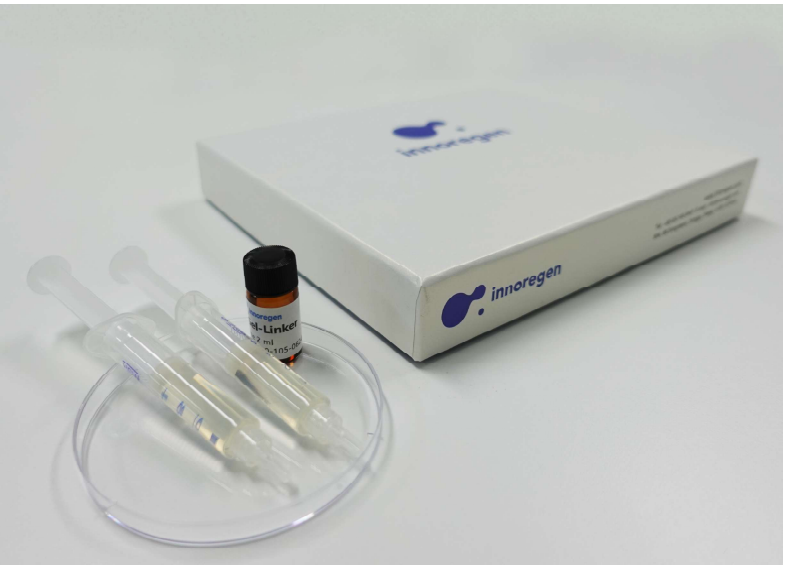
INNOREGEN manufactures and sells bioinks including Gel4Cell, Gel4Cell®-BMP, Gel4Cell®-VEGF, Gel4cell®-TGF, Col4Cell, etc., providing the optimal environment for making living cells to realize the dream of artificial organs.

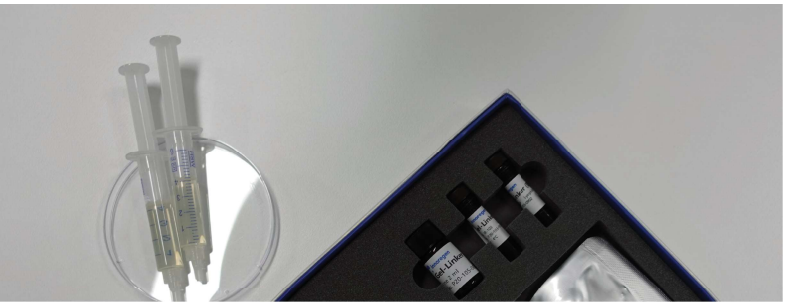
Customized scaffolds

After selecting a bioink suitable for the research field and anatomical part and receiving the cells, INNOREGEN can print and supply the tissues required by any researcher.

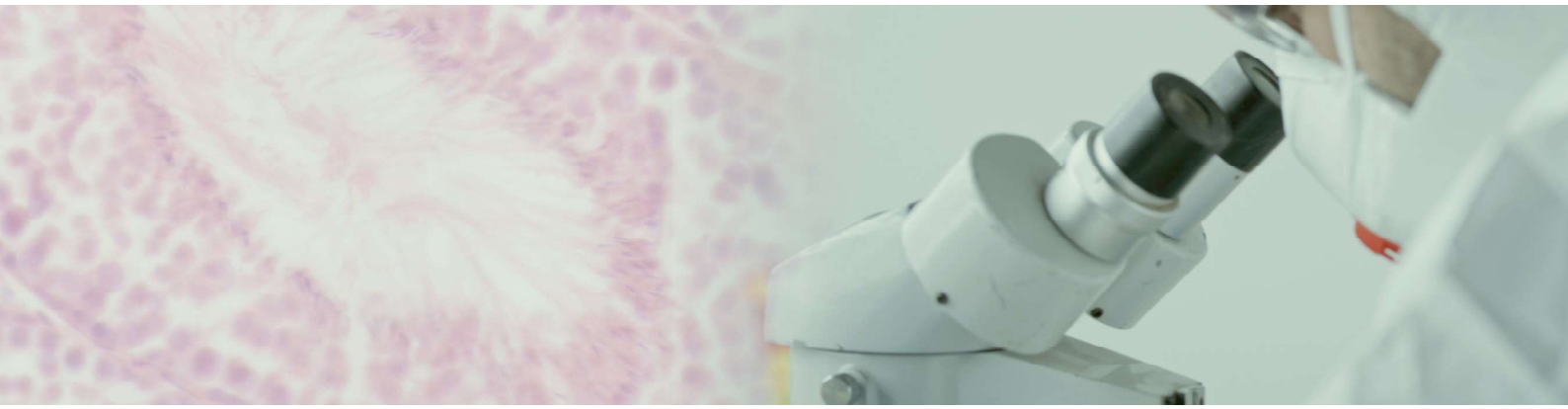
PRODUCTS OF INNOREGEN

Gel4Cell® | Gel4Cell®BMP | Gel4Cell®-VEGF | Gel4Cell®-TGF | PolyInks®-PCL&PLA | PolyInks®-PLCL-W, M, Y | Col4Cell | Gel4Tissue



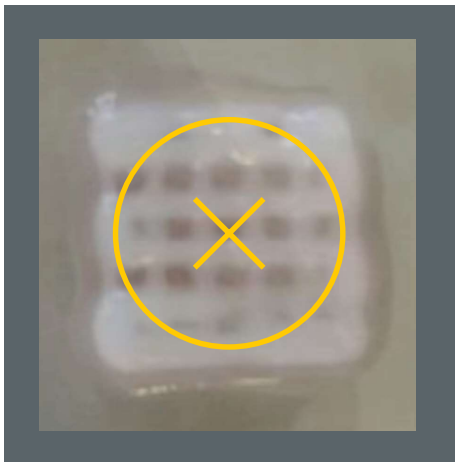


Product case design may vary depending on the season and release date.

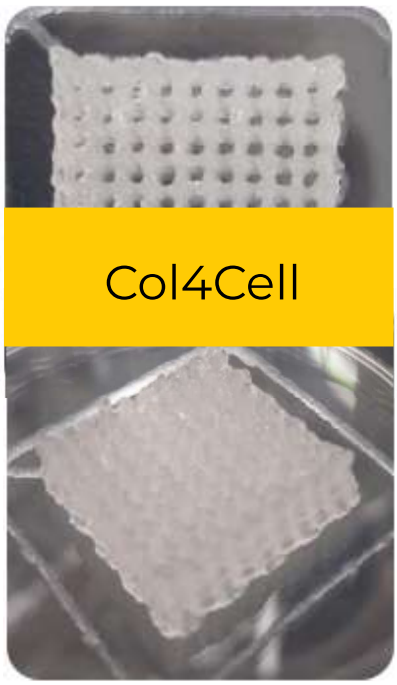


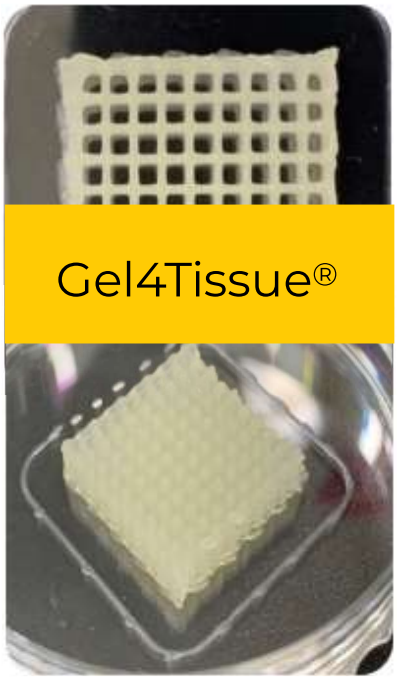
Our Quality Promise

INNOREGEN is able to provide new and innovative products to customers by continuously researching and overcoming challenges with expertise and passion to create new technology. All of our products conform to strict standards.



other company

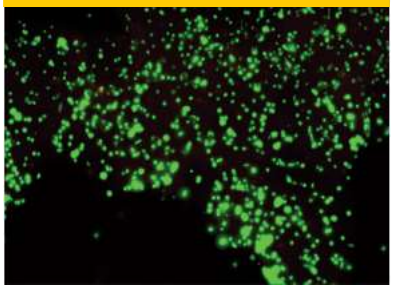




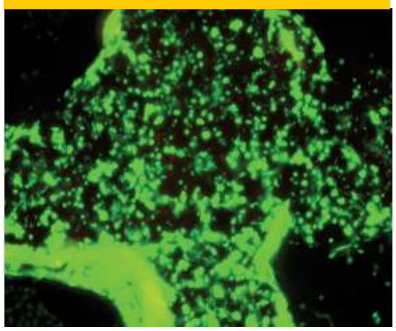
Innoregen Bioink Printability & Stability

Whether or not to maintain the physical properties of the bio-ink after printing or over time was a big problem, and the problem was solved through a lot of time and effort.

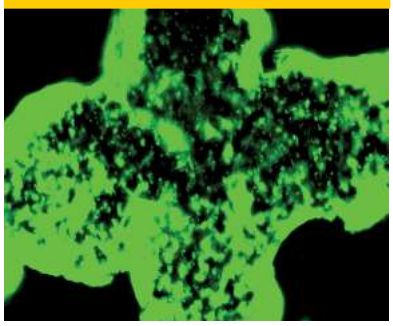
Gel4Cell 1st day fluorescence



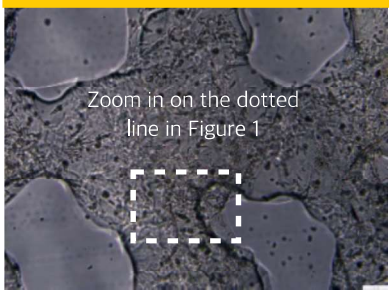
Gel4Cell Day 2 fluorescence



Gel4Cell Day 4 Fluorescence



Gel4Cell Day 4 electron microscopy



Gel4Cell Day 4 Fluorescence

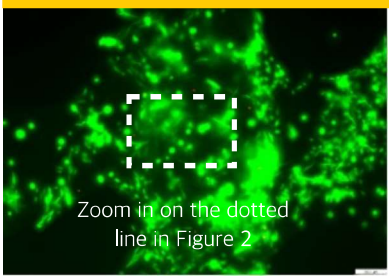


Figure 1 Electron microscope

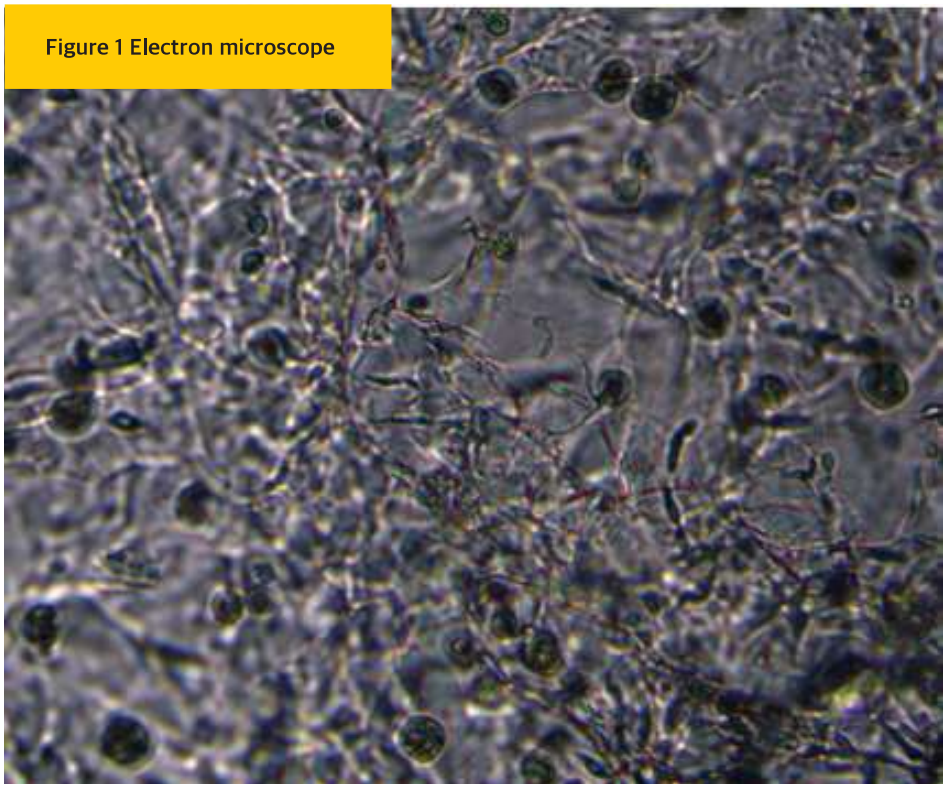
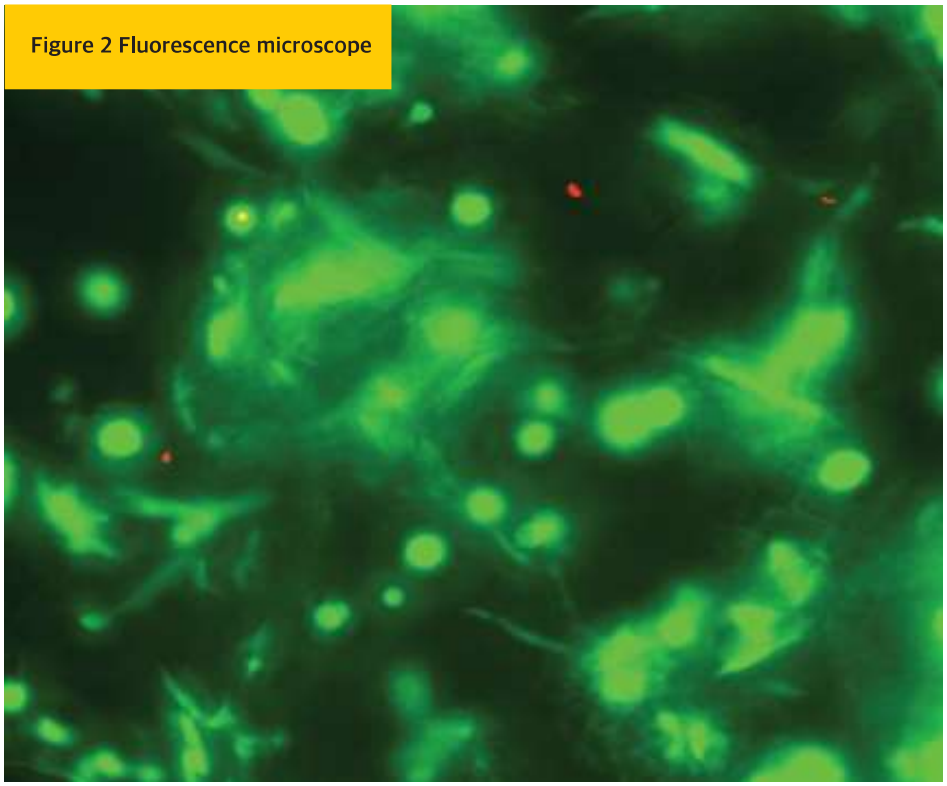


Figure 2 Fluorescence microscope



Innoregen Bioink Cell Viability/Proliferation

It has excellent cell viability as well as physical properties for shape.
Papers written by third parties with no interest are also well received. (SCI Biofabrication Bioink properties before, during and after 3D bioprinting Katja Hölzl et al.,2006)

Innoregen is the current company name. Changed the company name from Bioink solution to Innoregen in 2020.

TABLE 1.
APPLICATION

APPLICATION PRODUCT NAME	NOMAL CELL	MSCs	iPSC	Osteo genesis	Chondro genesis	Angio genesis	Scaffold	
Gel4Cell®	✓	✓	✓				✓	
Gel4Cell®-BMP		✓	✓	✓			✓	
Gel4Cell®-VEGF		✓	✓		✓		✓	
Gel4Cell®-TGF		✓	✓			✓	✓	
PolyInks®-PCL&PLA							✓	
PolyInks®-PLCL W,M,Y							✓	
Gel4Tissue®	✓	✓	✓				✓	
Col4Cell®	✓	✓	✓				✓	
Customizing	✓	✓	✓	✓	✓	✓	✓	

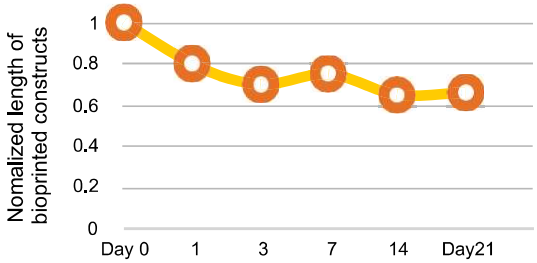
TABLE 2.
ORGANOID

APPLICATION PRODUCT NAME	Skin	Bone	Cartilage	Vascular	Organoid	Spheroid		
Gel4Cell®	✓	✓	✓	✓	✓	✓		
Gel4Cell®-BMP		✓						
Gel4Cell®-VEGF	✓			✓				
Gel4Cell®-TGF			✓					
PolyInks®-PCL&PLA	✓	✓	✓	✓				
PolyInks®-PLCL W,M,Y	✓	✓	✓	✓				
Gel4Tissue®	✓	✓	✓	✓	✓	✓		
Col4Cell®	✓	✓	✓	✓	✓	✓		
Customizing	✓	✓	✓	✓	✓	✓		

Gel4Cell®

A bioink for 3D bioprinting with improved bio-compatibility and structural safety using a gelatin hydrogel that can be applied to overall research on regenerative medicine.

-A material with high cell viability and excellent compatibility
-High output and uniformity
-UV crosslinking for structural stability



90% survival rate up to 7 days

Optimal output resolution and uniformity provided

Gel4Cell®-BMP

Gel4Cell®-Peptides

Gel4Cell®-Peptides has enhanced functionality by combining peptides with existing Gel4Cell®.
Gel4Cell®-BMP is a product for bone regeneration while Gel4Cell®-VEGF is for skin and blood vessel regeneration, and Gel4Cell®-TGF is for cartilage regeneration.

Gel4Cell®-BMP

A bioink that can be applied to research on bone regeneration by using BMP-2 peptide as a bone regeneration growth factor.

Base ink: Gel4Cell®
Gel4Cell® combined with BMP-2 peptide
Cell compatibility and bone morphogenic material
High output and uniformity
UV crosslinking for structural stability

Gel4Cell®-VEGF

Gel4Cell®-Peptides

Gel4Cell®-Peptides has achieved enhanced functionality by combining peptides with existing Gel4Cell®. Gel4Cell®-BMP is a product for bone regeneration while Gel4Cell®-VEGF is for skin and blood vessel regeneration, and Gel4Cell®-TGF is for cartilage regeneration.

Gel4Cell®-VEGF

A bioink that can be applied to research on skin and blood vessel regeneration by using VEGF peptide as an angiogenic factor

Base ink: Gel4Cell®
Gel4Cell ® combined with VEGE peptide
Cellular compatibility and angiogenic substances
High output and uniformity
UV crosslinking for structural stability

Gel4Cell®-TGF

Gel4Cell®-Peptides

Gel4Cell®-Peptides has achieved enhanced functionality by combining peptides with existing Gel4Cell®. Gel4Cell®-BMP is a product for bone regeneration while Gel4Cell®-VEGF is for skin and blood vessel regeneration, and Gel4Cell®-TGF is for cartilage regeneration.

Gel4Cell®-TGF

A bioink that can be applied to research on cartilage regeneration by using TGF-β1 peptide as a cartilage regeneration growth factor

Base ink: Gel4Cell ®
Gel4Cell ® combined with TGF-β1 peptide
Cellular compatibility and cartilage-generative substance
High output and uniformity
UV crosslinking for structural stability

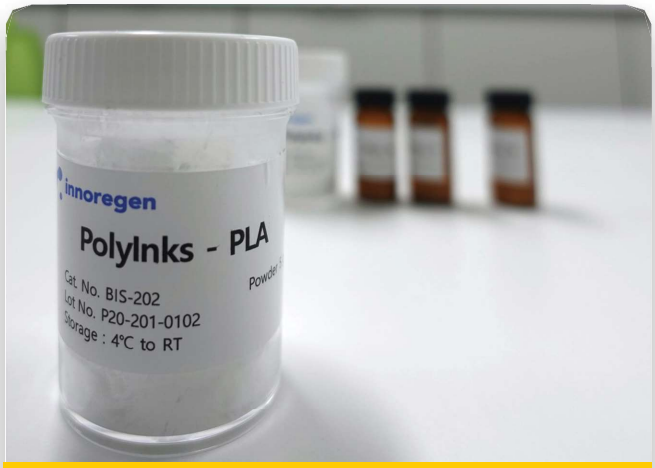
PolyInks®-PCL

Poly (ε-caprolactone), (PCL, PolyInks®-PCL) and polylactide (PLA, PolyInks®-PLA) are used in wider fields of tissue engineering than other biodegradable polymer materials.

PolyInks®-PCL

A Caprolactone synthetic polymer that has excellent biodegradability and can be applied to various kinds of research, such as tissue engineering, 3D bioprinting and drug delivery systems.

-Poly(ε-caprolactone) (PCL)
-Powder-type
-Printing temperature: 65-100℃



PolyInks®-PLA

Poly (ε-caprolactone), (PCL, PolyInks®-PCL) and polylactide (PLA, PolyInks®-PLA) are used in wider fields of tissue engineering than other biodegradable polymer materials.

PolyInks®-PLA

A L-lactide synthetic polymer that has excellent biodegradability and can be applied to various kinds of research, such as tissue engineering, 3D bioprinting and drug delivery systems.

Poly(L-lactide) (PLA)
Powder printing
temperature: 200-250℃

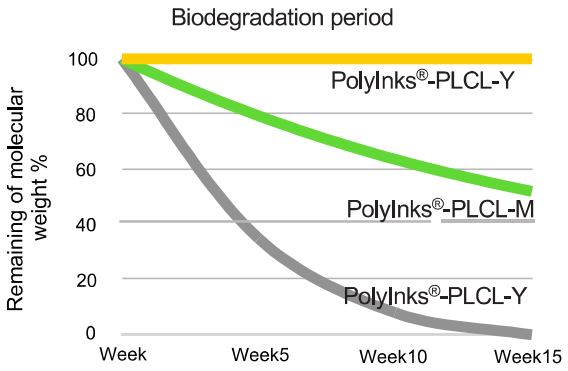
PolyInks®-PLCL-W, M, Y

A synthetic polymer with controlled biodegradability through the mixture of PLA and PCL that can be applied to various kinds of research, such as tissue engineering, 3D bioprinting and drug delivery

Poly(carprolactone-co-lactide)s
Powder-type
Printing temperature: 70-250

Biodegradation period

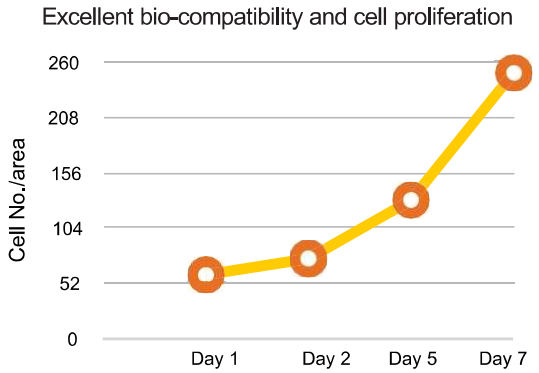
PolyInks®-PLCL-W (2-6 weeks)
PolyInks®-PLCL-M (6-10 weeks)
PolyInks®-PLCL-Y (10-16 weeks)



Gel4Tissue®

A bioink that can be applied to research on the regeneration of artificial organs and tissues by using porcine mesenteric extracellular matrix (SIS-ECM)

Extracellular Matrix (ECM): A support structure that helps cells grow in vivo
(Various growth factors and structural supports included)

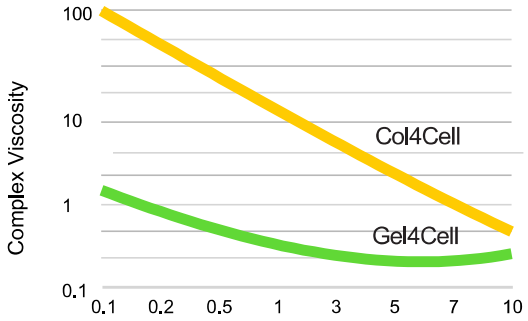


Col4Cell

A bioink for 3D bioprinting with improved bio-compatibility and structural safety by using a collagen hydrogel that can be applied to overall research on regenerative medicine.

Easy handling due to low viscosity before crosslinking, and excellent mechanical properties after crosslinking because the crosslinking is strong

Excellent physical properties



Complex Viscosity
-Before Curing-

Customizing

Customized bioinks suitable for clinical applications and anatomical sites depending on the research field

Procedure

After you explain the bioink you want to use by sending a customized e-mail on our website, we will assign the staff in charge suitable for each field to the R&D team and will continue to communicate with you to get the best results.

Once the personalized product is produced, it is uploaded on the website and you can purchase it from our online shopping mall.

Reference

Gel4Cell®

Gel4Cell®BMP

Gel4Cell®-VEGF

Gel4Cell®-TGF

PolyInks®-PCL&PLA

PolyInks®-PLCL-W, M, Y

Col4Cell

Gel4Tissue®

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ROAD MAP&PLAN

The goal of INNOREGEN is artificial organs. They may be seen in science fiction films, but we at INNOREGEN want to make them a reality, not just a dream, even though the path to artificial organs may be long and difficult.

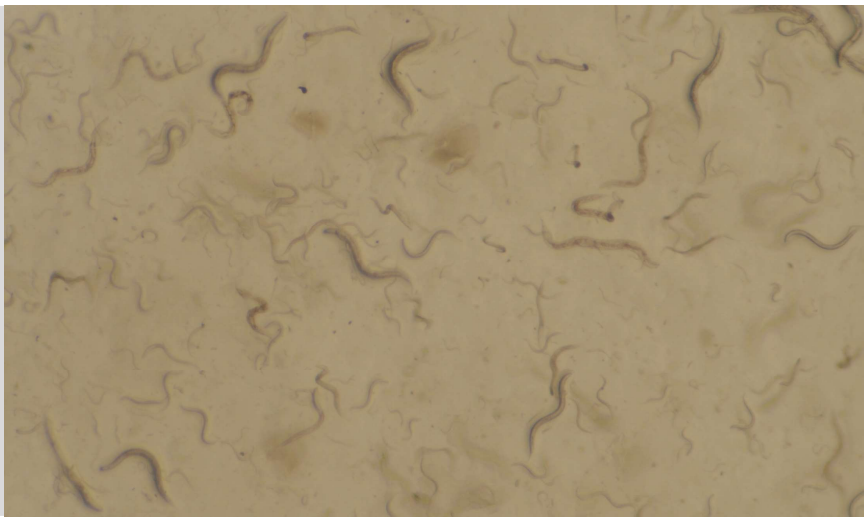
To achieve our goal, more efforts and studies will be required, but social consensus, the medical laws and institutional government policies must provide support to help open the era of artificial organs and lead to a better future and a better society.

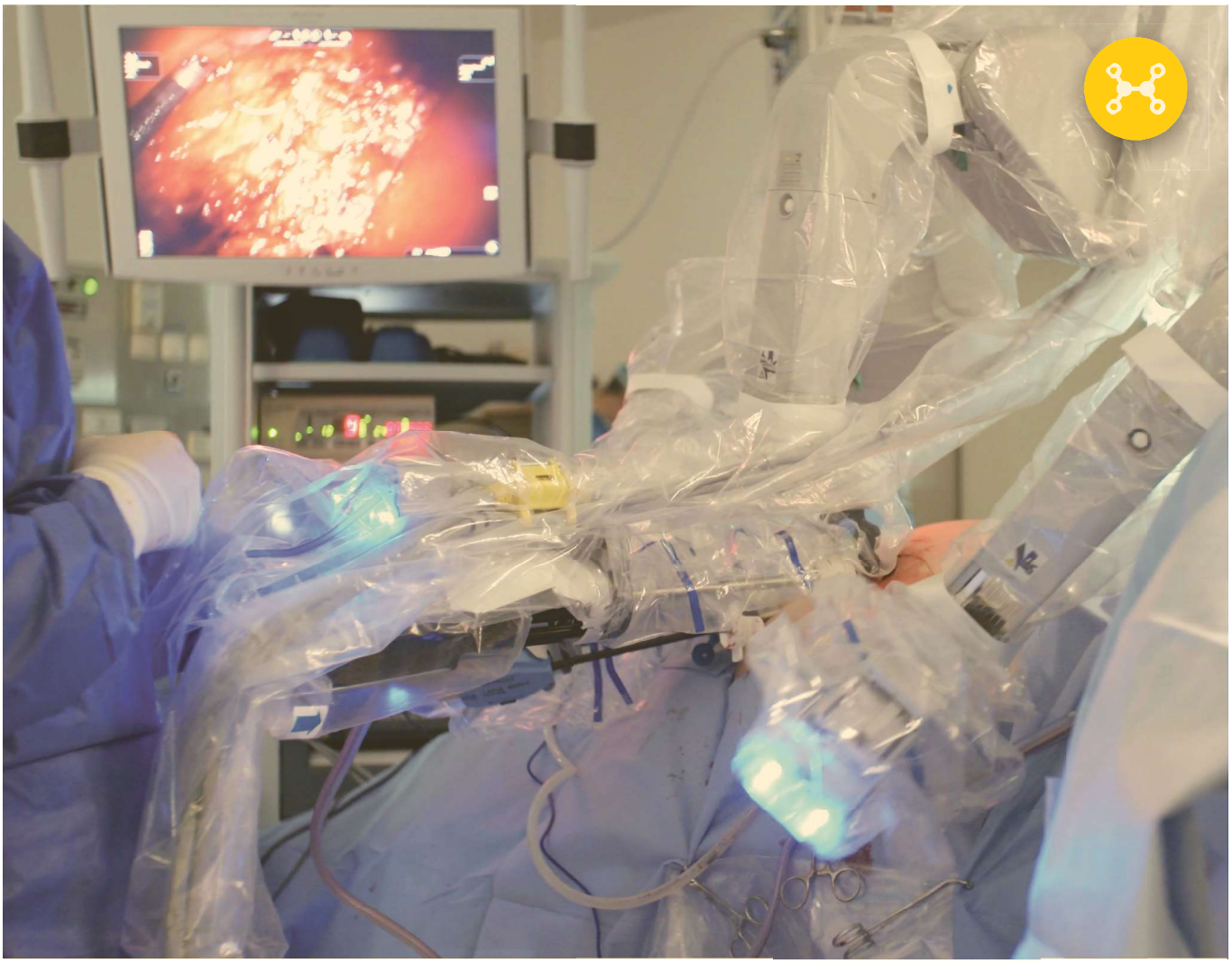
To make a science fiction dream a reality, we have been putting in an enormous effort. We have developed bioinks that can become basic materials and have obtained a lot of source technologies. In this chapter, we will deal with what can be commercialized with our technology in addition to our products.

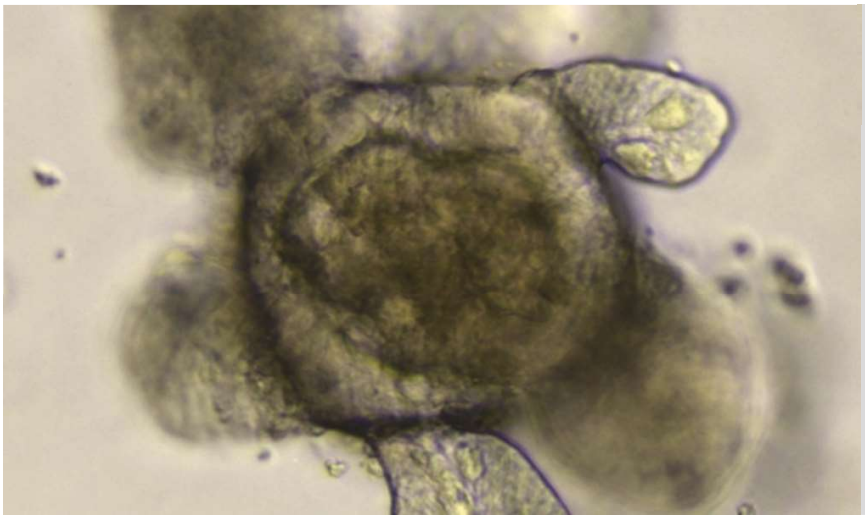
We at INNOREGEN have obtained great achievements and satisfactory results on our own, but that is just a first step on the path to producing artificial organs. However, we will continue to strive and we will never give up.

Cell culture agent

Cell culture agents are substances that provide an optimal environment for cells to grow. They can be used to make artificial organs that vary in shape and form for each organ and apparatus. Existing cell culture agents using materials isolated from sarcoma of an EHS mouse have a remarkably different composition from the human body, so there is a clear limitation in that they are materials impossible to be applied to the human body. INNOREGEN started developing its cell culture agents after receiving orders for cell culture agents using human-derived materials and silk sericin for a project promoted by the Ministry of SMEs and Startups.





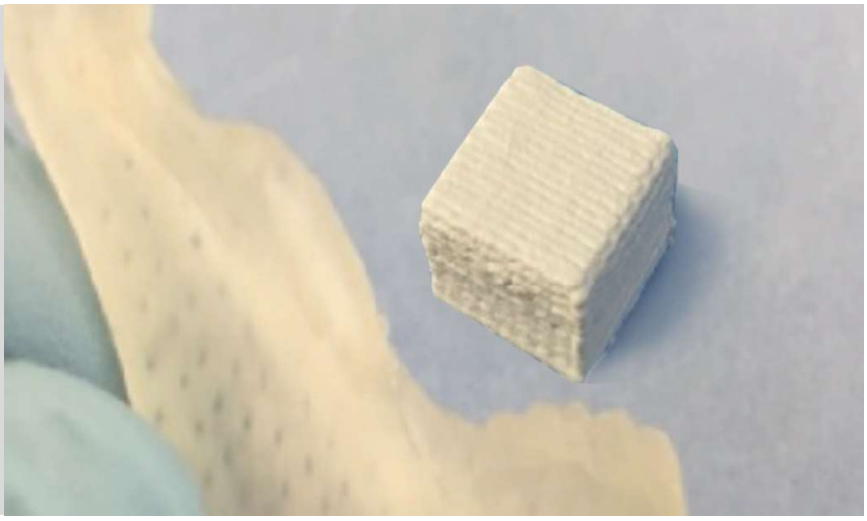


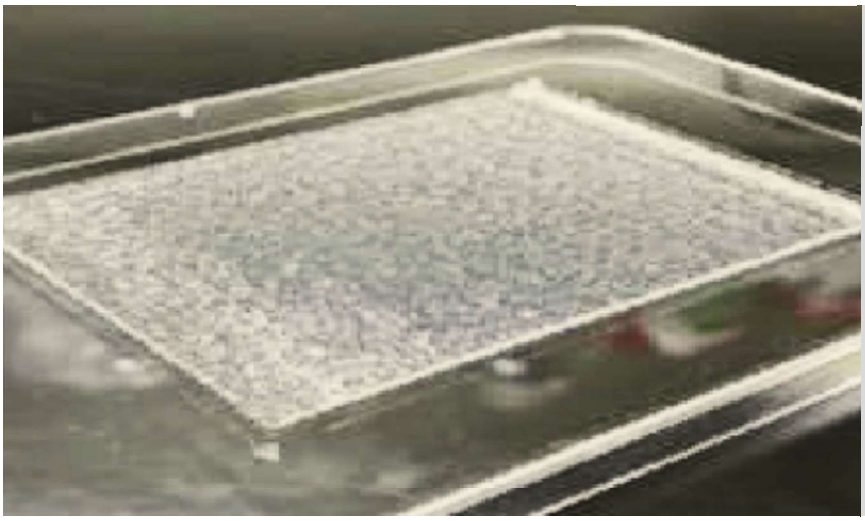
Organoids

Looking at the latest trends in organoids, there is a clear limitation in Corning's Matrigel, which was previously used as a culture medium. It is not clinically possible as it is an ECM derived from tumors in mice. Accordingly, the development of bioinks and hydrogels for producing organoids is progressing rapidly, and INNOREGEN possesses the best technology for bioinks that can be used for organoids.

Bone graft material

We developed the world's first bone transplantation culture using 3D bioprinting. It is a technology that injects bone growth factors in conjugation with bioinks to properly position biphasic calcium phosphate (BCP).
After a lot of research, INNOREGEN is able to implement bone regeneration stably and continuously, as BMP is released slowly and continuously upon the injection of a bioink optimized for bone transplantation with BCP and a bone growth factor.





Wound dressing material

INNOREGEN's bioinks consist of gelatin, hyaluronic acid, and glycerol, which are human body-friendly and highly renewable.

In particular, since they easily to bind to polypeptides such as VEGF when applied to wound tissue, significant effects on wound healing could be confirmed. INNOREGEN intends to commercialize this technology and present a new alternative in the field of advanced wound management.

Soft implant for kidneys

In the existing attempts at therapies for kidney regeneration, stem cells were mainly used, but our technology involves extracting a stem cell factor with proteins and injecting it into hydrogel and kidney parenchyma.

The technology of soft implants for kidneys, which has already been verified through numerous papers, can be implemented with our know-how on the use of a stem cell factors and hydrogels that can deliver the factor to the renal parenchyma without damaging it.

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WE CHERISH HUMAN

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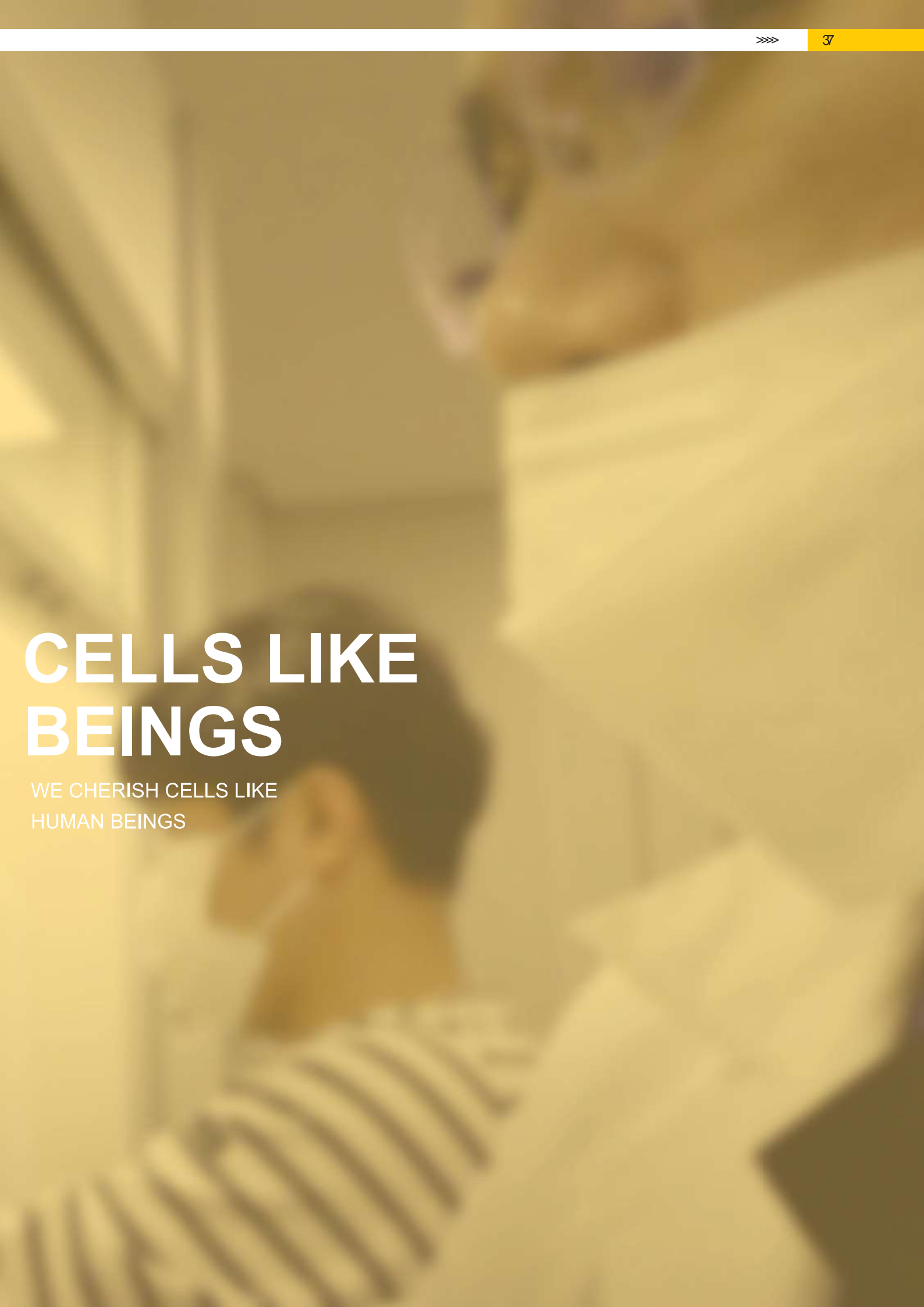

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MANAGER JJ Lee

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