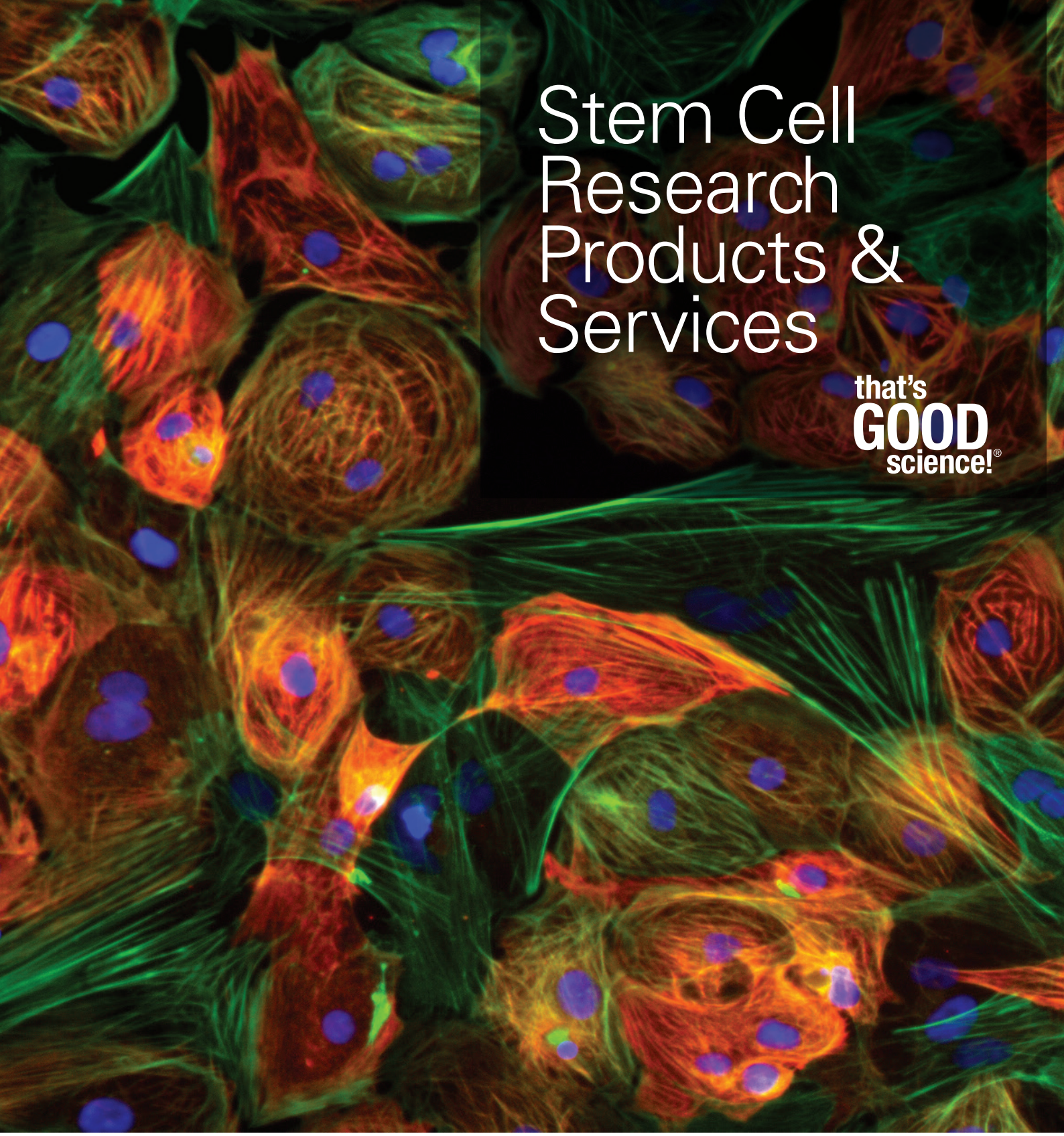


Stem Cell Research Products & Services

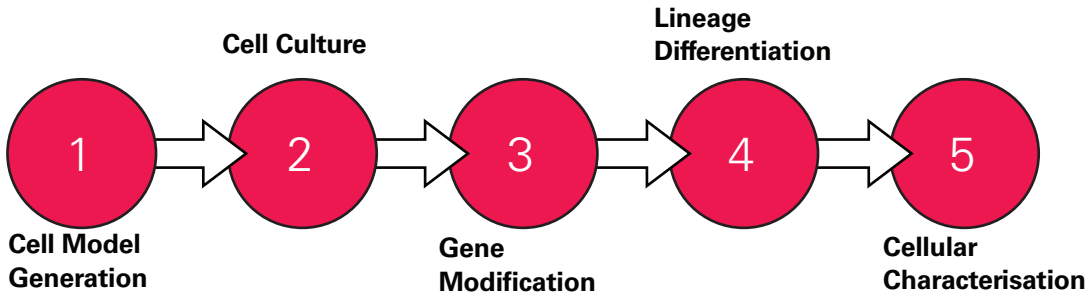
that's GOOD science!®

TaKaRa

Scientists supporting scientists

With over 15 years of stem cell experience behind our Cellartis® brand, we test the boundaries of knowledge to facilitate your exploration of development and disease.

Products and expertise for every stage of your research:



Successful human pluripotent stem cell culture

Our human iPS and ES cell lines have been cultured in the Cellartis DEF-CS™ 500 Culture System, an easy-to-use, complete culture system for efficient human pluripotent stem (hPS) cell expansion in a feeder-free, defined environment. With this system, cells are maintained in an undifferentiated state with virtually no background spontaneous differentiation.

Characteristics of Cellartis human iPS cells*

Product name	Age	Confirmed differentiation	Karyotype (from banked cells)
Cellartis human iPS cell line 7 (ChiPSC7)	20	Beta cells, Cardiomyocytes, Hepatocytes	46, XX
Cellartis human iPS cell line 12 ChiPSC12)	24	Beta cells, Cardiomyocytes, Hepatocytes, Neural progenitors	46, XY
Cellartis human iPS cell line 18 (ChiPSC18)	32	Cardiomyocytes, Hepatocytes, Neural progenitors	46, XY
Cellartis human iPS cell line 22 (ChiPSC22)	32	Beta cells, Cardiomyocytes, Hepatocytes, Neural progenitors	46, XY

*HLA typification is available on our website

Following reprogramming, successful expansion of your pluripotent stem cells is crucial.

The DEF-CS culture system, a research-grade system, contains the basal medium, a coating reagent, and growth factors for the easy culture of hPS cells as a non-colony type (2D) monolayer.

The highly reproducible nature of the system, coupled with its ability to ensure an efficient and predictable growth rate, makes the DEF-CS culture system ideal for the expansion and scale-up of a homogeneous population of hPS cells.

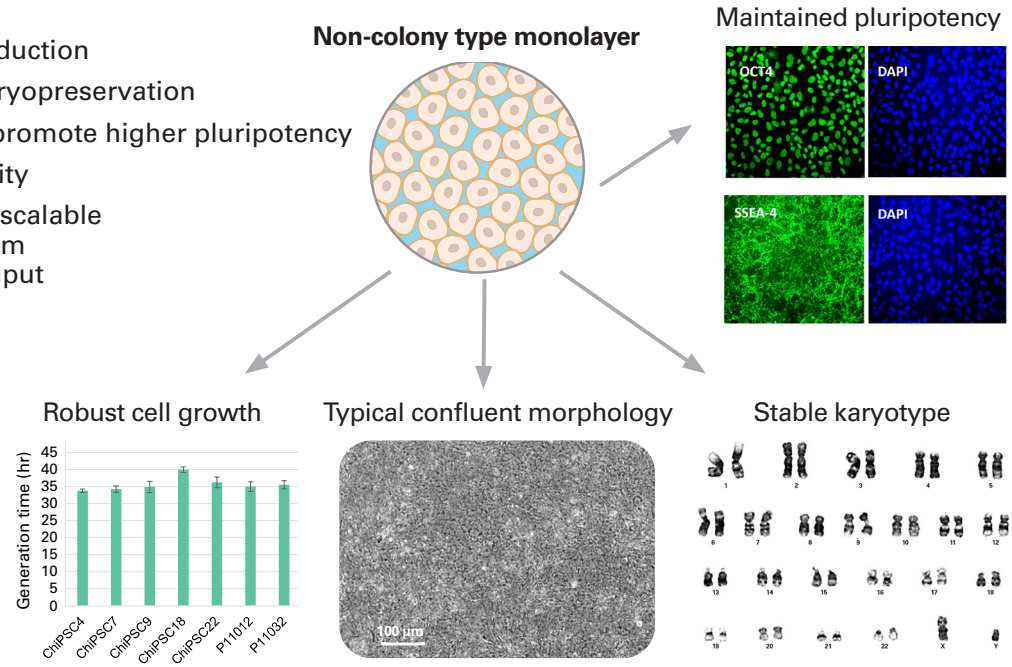
Enabling translational research with innovative products

Basic research and preclinical proof-of-concept studies are the foundation for any therapeutic strategy. Cellartis DEF-CS 500 Xeno-Free Culture Medium smooths the transition from basic research into the next stages of validating robustness in relevant disease models and developing a manufacturing strategy.

The path to therapies includes GMP-grade production and clinical studies for safety and efficacy. Cellartis DEF-CS 500 Xeno-Free GMP Grade Basal Medium is manufactured according to the guidelines for GMP investigational products. A Drug Master File (DMF) on this product has been registered with the Pharmaceuticals and Medical Devices Agency (PMDA), a Japanese governmental organization.

Benefits of monolayer culture using the DEF-CS Culture System

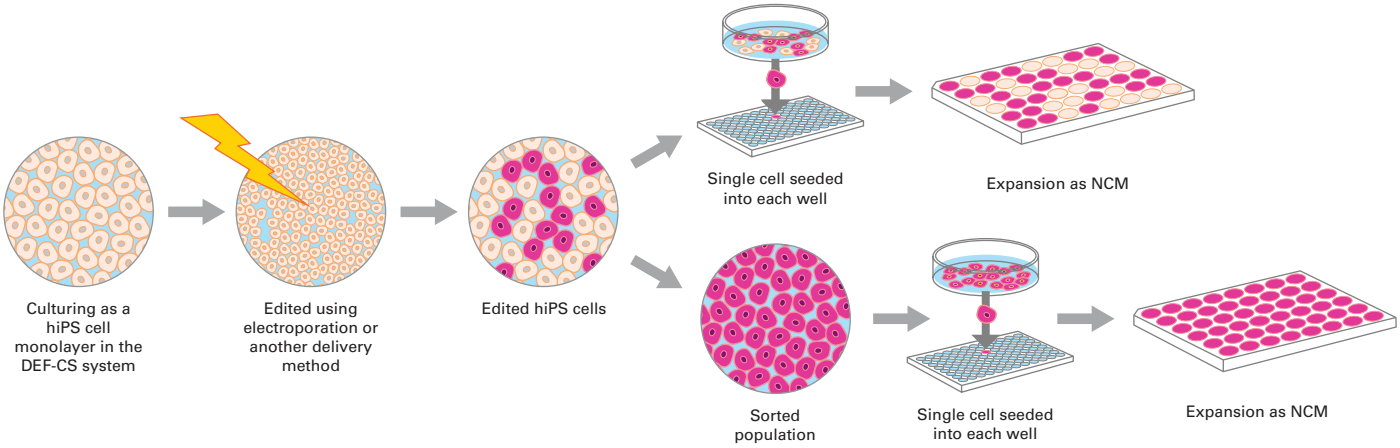
- Precisely control growth rates
- Significantly increase cell production
- Enhance recovery following cryopreservation
- Suppress differentiation and promote higher pluripotency
- Maintain chromosomal integrity
- Provide a simple, robust, and scalable format suitable for downstream applications like high-throughput screening, drug discovery, and gene editing



Why is the DEF-CS culture system optimal for gene editing?

The unique combination of precise, footprint-free CRISPR/Cas9 editing techniques and hPS cells enables the generation of sophisticated disease models. However, gene editing protocols often subject stem cells to harsh conditions that compromise their survival (e.g., electroporation), a problem that is compounded by the innate challenges of single-cell culture for mutant isolation and characterization. A culture system that supports single-cell cloning and expansion of human pluripotent stem cells could overcome the current barrier of poor outcomes for single cells.

The Cellartis DEF-CS 500 Culture System sustains continuous growth of hPS cells in a feeder-free, non-colony type monolayer (NCM), including during the gene editing protocol. Enzymatic passaging into an optimal microenvironment maximizes successful single-cell cloning and expansion into edited clonal lines.

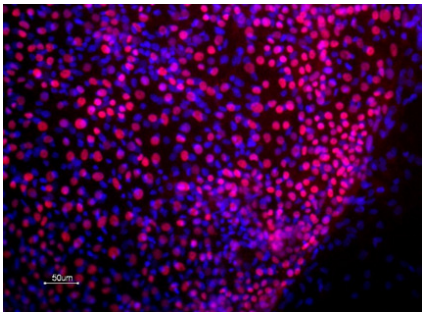


Guiding gene editing in stem cells

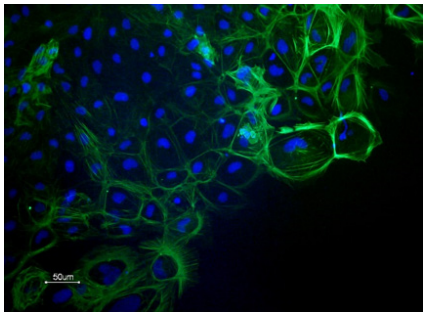
The CRISPR/Cas9 system is an easy, robust editing mechanism in stem cells. No matter which gene-editing protocol you choose (transgene delivery via electroporation, viral vectors, or cell-derived nanovesicles called gesicles), we have the tools to enable successful knockins and knockouts. While the DEF-CS culture system provides the foundation for human iPS cell survival and the formation of edited clonal lines, our Guide-it™ tools support the overall editing workflow. Data about the suitability of this system for single-cell cloning and for gene-editing applications is available on our website: takarabio.com/single-cell-cloning

The DEF-CS culture system prepares cells for directed differentiation

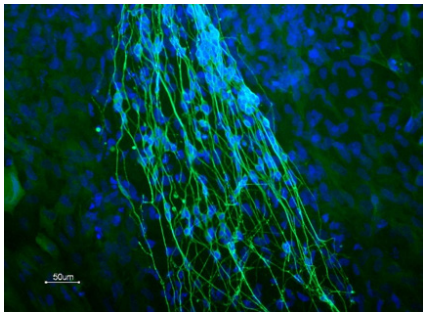
Once you have a highly pure, pluripotent population, you can efficiently direct its differentiation into any of the three germ layers: endoderm, mesoderm, or ectoderm. Successful differentiation depends on the quality of the starting material: a homogeneous, undifferentiated stem cell population is ideal.



Endoderm (HNF4A)



Mesoderm (ASMA)



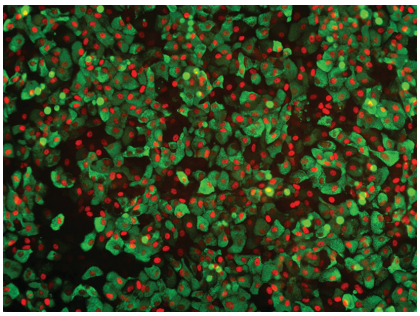
Ectoderm (Beta-tubulin III)

Human iPS cell-derived cells

We specialize in the generation of high-quality hepatocytes, beta cells, and definitive endoderm cells—enabling you to easily obtain ready-made, iPS cell-derived cells. If customization is what you're after, differentiate your own pluripotent cells down your desired lineage, or use Cellartis Human Pluripotent Stem Cell Services to source, generate, and differentiate lines for you (read more about services on page 6).

Try our:

- Hepatocytes
- Definitive endoderm cells
- Beta cells



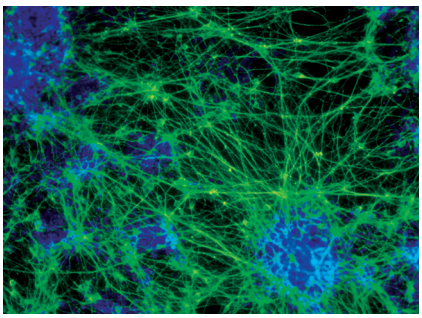
Cellartis beta cells fixed 14 days post-thaw. These cells express C-peptide (green) and MAFA (red), indicators of insulin production.

Media for neural differentiation

Directing neural differentiation from ES cells or neural stem (NS) cells requires optimized reagents in order to ensure a reliable outcome.

NDiff® 227 neural differentiation medium supports straightforward differentiation of mouse pluripotent stem cells into the neural lineage. Using a traditional formulation supplemented with N2 and B-27, this medium enables simple and efficient neural differentiation.

RHB-A® neural stem cell culture medium enables derivation, maintenance, and expansion of NS cells. By sequentially withdrawing growth factors, differentiation of NS cells into functional neurons can be achieved.



Pluripotent stem cells differentiated into neurons using NDiff 227. These cells express neuron-specific class III beta-tubulin (Tuj1), which stains green.

Coating Matrix

iMatrix-511

- Chemically defined, xeno-free iPS/ES cell culture substrate
- Recombinant laminin-511 E8 fragments sustain long-term self-renewal
- Promotes high expression of pluripotency and normal karyotype

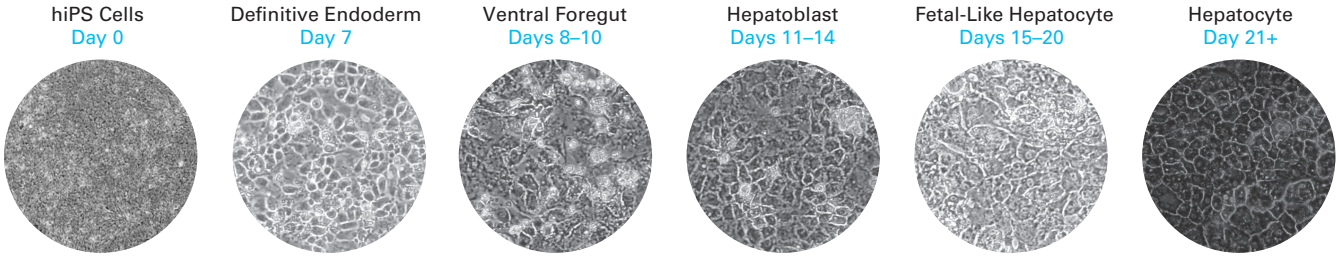
that's GOOD science!

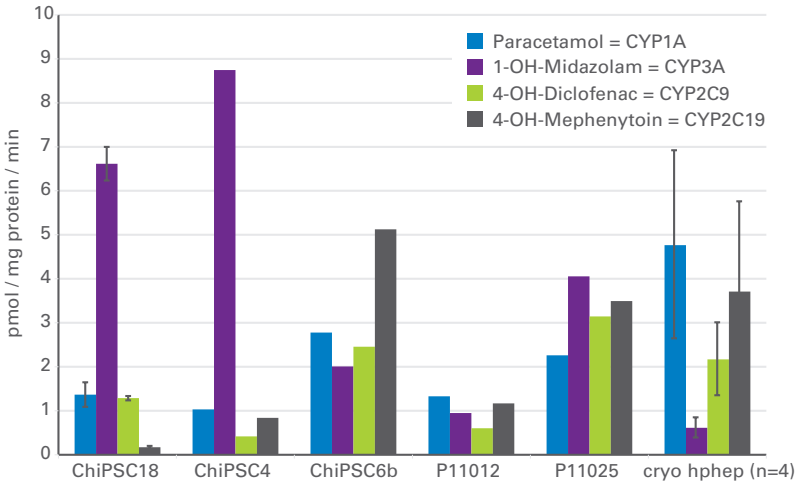
Create your own human iPS cell-derived hepatocytes

Hepatocytes derived from human iPS cells are an alternative to primary hepatocytes as they express major hepatic markers and demonstrate stable cytochrome P450 (CYP) activities over time in culture.

The Cellartis iPS Cell to Hepatocyte Differentiation System simplifies the production of large panels of iPS cell-derived, functional hepatocytes with your desired genotypes/phenotypes for disease modeling, drug discovery, drug metabolism research, and hepatotoxicity studies.

- **Highly reproducible, robust system**—the same protocol has been shown to work across 25 different iPS and ES cell lines. There is no need to optimize for your lines.
- **Ideal for drug metabolism and safety studies**—consistently generate panels of functional, iPS cell-derived hepatocytes with diverse genetic backgrounds.
- **Customized starting materials**—start with any patient- or disease-specific human iPS cell lines and create accurate liver disease models.





CYP activity of human iPS cell-derived hepatocytes recapitulates the inter-individual variation of the human population. CYP activity was measured by LC/MS and normalized to the protein content per well in iPS cell-derived hepatocytes (29 days after the start of differentiation). Activities were comparable with cryopreserved human hepatocytes (cryo hphep) from four different donors. Hepatocytes derived from five different hiPS cell lines show diverse CYP activity profiles, reflecting the metabolic diversity found in human primary hepatocytes from different donors. For example, CYP2C19 activity is low in ChiPSC18, but high in ChiPSC6b, reflecting naturally occurring interindividual variation.

Working with human primary hepatocytes?

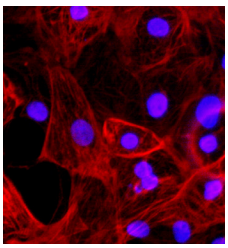
Extend the culture time of your human primary hepatocytes.

Cellartis Power™ Primary HEP Medium maintains primary hepatocyte viability and metabolic activity for four weeks as measured by CYP activities, albumin secretion, and CYP induction capabilities.

View more data at takarabio.com/Power-medium

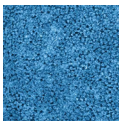
Get started on your own cell model at: takarabio.com/DIY-hepatocytes

Cellartis Human Pluripotent Stem Cell Services



Our team offer a variety of services for your iPS cell-based project. This includes donor material sourcing and reprogramming, cell differentiation and gene editing. All our services are accompanied by expert feasibilty planning and project management support to ensure the success of your project.

With our world-renowned scientific and technical expertise you can be confident that all our procedures are performed with the highest quality standards and appropriate controls.



Clinical-grade hES cell line derivation

Generate clinical-grade human ES cell lines per your specifications.

Materials are sourced according to FDA guidelines, and the ES cell lines are generated under xeno-free, GMP-grade conditions.

Sourcing

Obtain patient- or disease-specific cells, according to your requirements, for later reprogramming into iPSCs.

Specify detailed donor requirements, such as gender, age, ethnic background, health status, genotype, blood type, and HLA type.

Reprogramming

Get high-quality, highly pure iPS cells from your samples or sourced samples.

Footprint-free reprogramming of your samples (PBMC or fibroblasts) or sourced PBMC samples using Sendai virus technology.

Resources

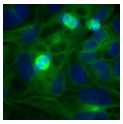
Visit our webpage for a range of resources including:

Selection Guides, Product Information, FAQs, Technical Notes, Webinars and Protocols

Cell banking

Generate a Master Cell Bank from your iPS or ES cells.

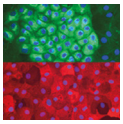
Highly pluripotent cells are efficiently expanded in the monolayer-based, feeder-free Cellartis DEF-CS 500 Culture System and cryopreserved.



Gene editing

Genetic engineering of your iPS or ES cell lines using CRISPR/Cas9 (RNP complex).

Gene knockin or knockout to create unique disease models for your research.



Directed differentiation

Make hepatocytes, beta cells, or definitive endoderm cells from your own patient- or disease-specific iPS or ES cell lines.

Our 15+ years' experience with endodermal lineage differentiation means you can count on us to deliver high-quality, functional cells.

Contact us

Interested in how our services can support the goals of your project?
Visit: takarabio.com/stem-cell-services

takarabio.com

TaKaRa

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