## Renewing Science - Recently Released Products for Stem Cell Research

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Stem cells can be invaluable tools for exploring research questions and treating disease. In the laboratory, stem cells often require a higher level of oversight and care due to the cells’ particular sensitivities to culture conditions and perturbations.

These recently released culture systems, cells, and antibodies may help simplify stem cell isolation, expansion, and maintenance.

**iPS Cell-Derived Hepatocytes**

Obtaining a relevant human hepatocyte cell model can be a challenge, especially when most models on the market are harvested or derived from cadavers, immortalized cell lines, and animals.

**iCell® Hepatocytes**from **Cellular Dynamics**are highly pure human hepatocytes, which the company asserts are more reproducible and readily available. Depending on what media is used in culture, these hepatocytes have a life span ranging from 21 to 28 days in comparison to three to seven days for hepatocytes from primary tissue sources.

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iCell® Hepatocytes from Cellular Dynamics are shown on a collagen matrix after seven days in culture. Evident are the key morphological features characteristic of hepatocytes, including: polygonal morphology, multinucleation, and bile canalicular formation.

These human hepatocytes are derived from a normal, healthy donor and can also be made from a broader population to study donor-specific phenotypes in detail. They are particularly well suited to aid in the research of infectious diseases including, but not limited to, hepatitis and malaria.

**Pluripotent Stem Cell Culture**

Background differentiation is a common disturbance when culturing undifferentiated human pluripotent stem cells.

**Takara Bio Europe’s Cellartis DEF-CSTM** is a feeder-free and defined culture system containing basal medium, additives, and coating compounds designed to eliminate background differentiation. The company reports that there is no need for cell selection because 98% of cells are maintained in an undifferentiated state when using this system. Enzymatic passaging as single cells makes DEF-CS ideal for single cell applications, including high-throughput screening, transfection, and seeding onto scaffolds.

**Mesenchymal Stem Cell Culture**

Evaluating and inducing human mesenchymal stem cells can be tedious and lengthy. It can take up to 20 days to fully develop bone matrix, but with **Biological Industries’ MSC GoRapid Osteogenic XFTM** **Kit**, the time to produce these results can be reduced to just 5–7 days. Biological Industries’ new formulation provides optimal conditions to rapidly differentiate cells.

The complete xeno-free formula is provided in one bottle with no nonhuman components. The kit is available for research use and for human mesenchymal stem cell tissue engineering purposes.

**Stem Cell-Relevant Antibodies**

ChIP-Seq is the principal technique utilized to determine how chromatin-associated proteins, such as transcription factors, influence gene expression.

Although it is known that rearrangements of pluripotency-associated transcriptional networks occur during differentiation and reprogramming, more research is warranted to precisely identify the genomic interactions associated with these proteins at different stages of a cell’s identity.

As only a small percentage of antibodies work well with ChIP-Seq, identifying a good antibody can be the biggest challenge. To aid researchers in this endeavour, **Activ Motif’s ChIP-Sequencing validated antibodies**are available for Oct4, Sox2, Nanog, KLF5 and TCF7L1. Active Motif’s Epigenetic Services team has rigorously tested these antibodies to ensure functionality for this application.

**Cyropreservation**

Cyropreservation protects cells from damage caused by chemical reactivity or decay over time, but cyropreservation media often contains DMSO, which can potentially interact with stem cells to alter their morphology and attachment.

**Funakoshi’s StemCell Keep** is designed to eliminate this risk, while increasing shelf life. The animal-derived protein-free and DMSO-free formulation eradicates any differentiation effect by DMSO. New original cryoprotectant material allows for cryoprotection of embryonic stem cells (ES) and induced pluripotent stem cell (iPS) colonies with a shelf life of up to two years after the date of manufacture when stored at 4°C.

**Vessels**

Stem cell culture requires stable and reproducible experimental conditions. The purity and sterility of culture vessels are important in achieving optimal stem cell culturing.

**Eppendorf’s BioBLU®Single-Use Vessels** are manufactured with USP Class VI and animal component-free materials, making them appropriate for GMP production. The BioBLU**®**series is available in various sizes, with working volumes ranging from 65 mL to 40 L.

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Eppendorf’s BioBLU® Single-Use Vessels ranging from 65 mL to 40L.

The BioBLU**®**’s sensors are clearly labelled,  easy to install, and help enable rapid turnaround, which ultimately shortens development time  and lowers operating costs. The BioBLU**®** vessels are compatible with the DASbox**®**Mini Bioreactor System, DASGIP**®** Parallel Bioreactor Systems, and New Brunswick**TM**bench scale system.

**Potassium Assay Kit**

Potassium channels are important for neuronal differentiation. Current thallium-based potassium ion channel assays require media replacements, making them slow and cumbersome. Background noise makes for inaccurate assessment of the small signals generated by low-conductance channels or low-expressing cell lines.

The **FLIPR®Potassium Assay Kit** from **Molecular Devices**directly measures potassium channel function using a thallium-sensitive indicator dye and background masking reagent to widen the assay window several-fold for many cell types. A homogenous no-wash protocol reduces well-to-well variation and makes assay automation easier. The kit can accommodate for use in 96-, 384-, and 1536-well formats in FLIPR and FlexStation microplate readers.

“The error bars are tighter with the new Molecular Devices kit, facilitating analysis of weakly expressed or weakly conducting potassium channels. The no-wash and no-buffer protocol disturbs cells less and speeds up automation,” wrote one of the kit’s beta testers, a principal scientist who leads pharmacology testing at a large pharmaceutical company.