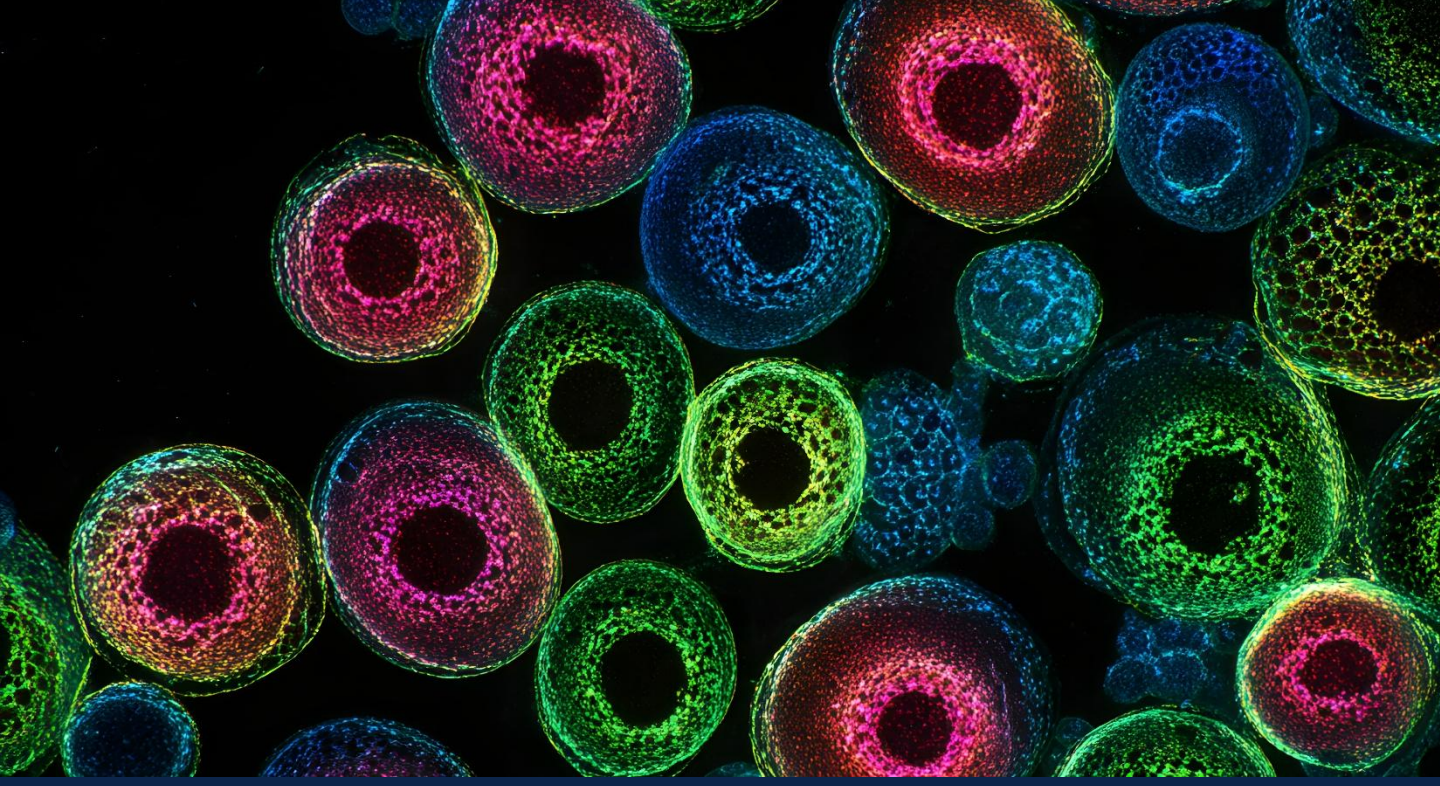


TECHNICAL WHITEPAPER

Stop Losing Your Cells.

A Practical Guide to Maximizing Cell Recovery in Stem Cell, Organoid, and Single-Cell Research Using Low-Adsorption Centrifuge Tubes.

STEMFULL™

PROTEOSAVE™

SUMITOMO BAKELITE CO., LTD. S-BIO Business Division

SECTION 01 · THE HIDDEN PROBLEM

The Hidden Cost Of Cell Loss

Every time cells enter a conventional centrifuge tube, a silent process begins. Proteins and cells adsorb to the hydrophobic surface, and they never come back. In serum-free conditions, this effect is dramatically amplified.

STEP 01 · START

Cell Suspension Enters the Tube

Cells, especially highly adhesive stem cells, come into direct contact with the inner wall surface of the centrifuge tube during transfer, centrifugation, and incubation.

STEP 02 · TRIGGER

Non-Specific Adsorption Occurs

The hydrophobic surface of standard PP/PS tubes attracts proteins and cell membrane components and cells directly and irreversibly adhere to the wall.

STEP 03 · LOSS

Cell Recovery Drops Significantly

Cells stuck to tube walls are lost during aspiration and transfer. Recovery rate decrease and in serum-free media it drops far below expected values, losses that are invisible to the researcher.

STEP 04 · CASCADE

Seeding Density Becomes Inconsistent

Downstream assays as colony formation, single-cell sequencing, organoid passaging begin with an unknown, variable cell input. Experiment-to-experiment reproducibility is compromised.

STEP 05 · CONSEQUENCE

Irreproducible Results & Wasted Resources

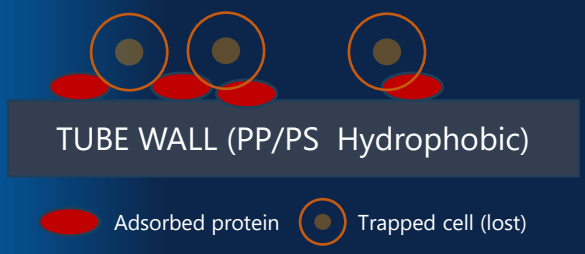
Failed experiments, wasted reagents, lost time — and For rare or precious samples such as patient-derived organoids or iPS-derived cells, this loss is simply unacceptable. The root cause? A tube that was never designed for your cells.

SECTION 02 · THE HIDDEN PROBLEM

The Science Behind the Surface

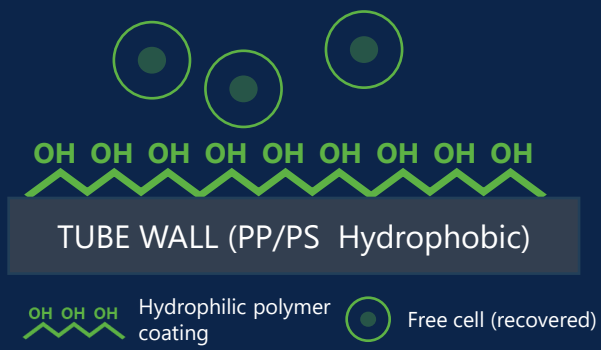
- ✓ Reduction of the adsorption of biological materials (proteins, peptides, etc.)
- ✓ Extremely Low elution amount of polymer coat which covalently binds to the surface material
- ✓ Resistance to organic solvents, surfactant and heat

Conventional Tube



Hydrophobic surface attracts proteins & cell membranes
Cell loss dramatically increases in serum-free media
No surface modification — adsorption is permanent
Leachable risk from physical coatings (other brands

STEMFULL™ and PROTEOSAVE™



Superhydrophilic polymer coating prevent cell adhesion to the tube walls and provide high recovery of cells after centrifuge
The superhydrophilic polymer is covalently bound to tube surface to minimize its elution amount

【Cells lines published】

mesenchymal stromal cell | Corneal epithelial cells | Intestinal cells | Periodontal ligament cells

and more!

Chemical, Heat and Cold Resistant of PROTEOSAVE™

Organic solvent	10%, 5 hr
Methanol	✓
Ethanol	✓
2-propanol	✓
Glycerol	✓
Acetonitrile	✓
Acetone	✓
DMSO	✓
2-mercaptoethanol	✓

Surfactant	0.1%
CHAPS	✓
Triton X-100	✓
Tween 20	✓
SDS	✓

Heat resistant	Cold resistant
100 ℃ (10 min)	-80℃ (3 months)

STEMFULL™ Maximizes Recovery of Highly Adhesive Cells

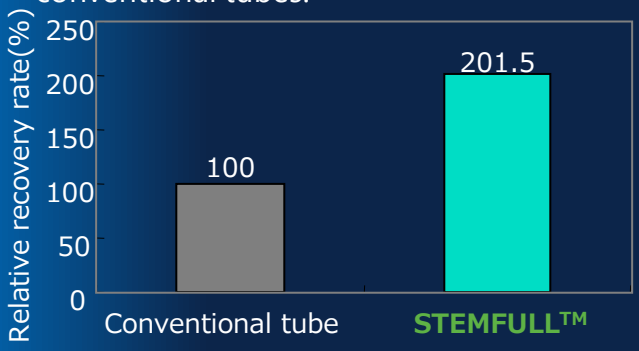
Highly adhesive stem cells are disproportionately lost in conventional tubes especially in serum-free conditions. STEMFULL™ recovers up to 2x more cells and dramatically improves downstream colony formation.

#Corneal endothelial Cell | #iPS-derived CD104 positive epithelial cells | #Colony-forming assay | #Serum free

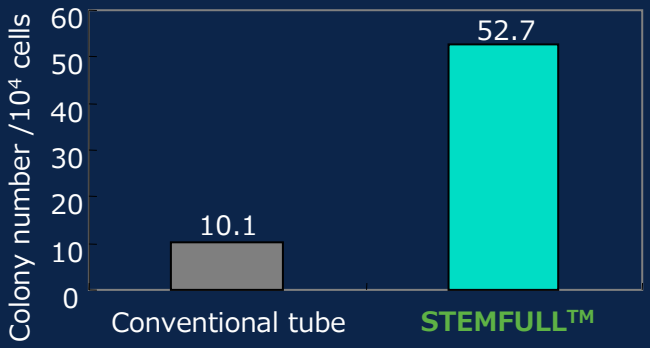
Comparison in Corneal Endothelial Cells

Data provided by Dr. Masakazu Yokoo, Dept. Ophthalmology, the University of Tokyo Hospital

STEMFULL is able to recover corneal epithelial cells from corneal endothelial tissue at approximately twice the rate of conventional tubes.



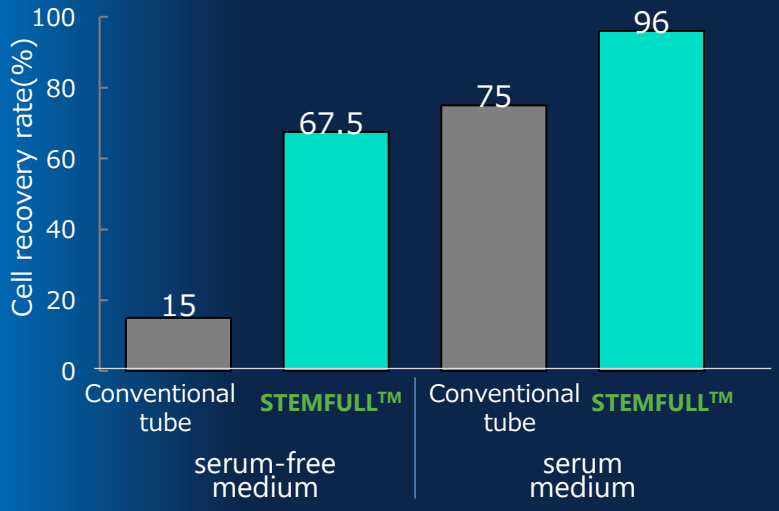
The number of colonies formed from recovered corneal epithelial cells was greater when using STEMFULL compared to conventional methods.



Comparison in CD104-positive epithelial cells derived from human iPS cells

Data provided by Dr. Ryuhei Hayashi, Stem Cells and Applied Medicine Lab, Osaka University Graduate School of Medicine

20,000 cells were suspended in serum / serum-free medium and cell recovery was evaluated after 2-hour storage at room temperature.



KEY FINDING

Across different highly adhesive cell types and institutions, STEMFULL™ outperformed conventional tubes. STEMFULL™ gave higher cell recovery, especially in serum-free media.

Use of STEMFULL together with serum medium reduced cell loss the most. Every recovered cell matters when samples are rare and irreplaceable.

STEMFULL™ & PROTEOSAVE™

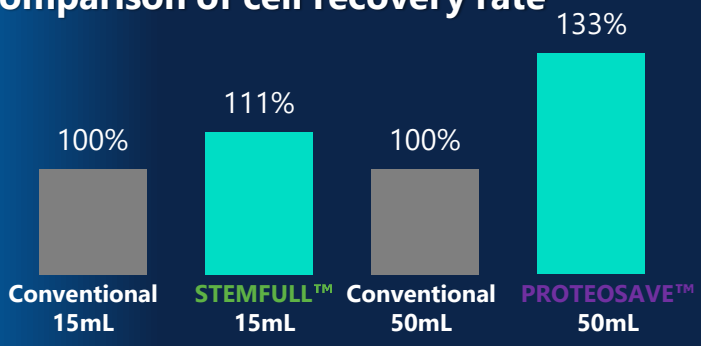
Enable Spheroid Formation Where Standard Tubes Fail

This application note examined the recovery rate of deciduous tooth stem cells and, as a new endeavor, conducted spheroid formation experiments using centrifuge tubes to perform larger organoids that are closer to the biological state for transplantation purposes.

#SHED (deciduous tooth stem cells) #Cell recovery #Spheroid formation

Data provided by : Professor Takayoshi Yamaza and Assistant Professor Soichiro Sonoda
Faculty of Dental Science Department of Dental Science, Kyushu University

Comparison of cell recovery rate



STEMFULL™ and PROTEOSAVE™ reduced cell adhesion to the centrifuge tubes and improved cell recovery rates compared to conventional tubes.

Comparison of cell recovery rate

Large spheroids observable by the naked eye were formed in STEMFULL™ and PROTEOSAVE™

KEY FINDING

Standard centrifuge tubes completely failed to support SHED spheroid formation, regardless of volume. In contrast, STEMFULL™ 15mL and PROTEOSAVE™ 50mL both produced large, macroscopically visible spheroids, opening new possibilities for transplantation models, organoid scale-up, and disease research.

APPLICATION NOTE 03 · ORGANOID RESEARCH

STEMFULL™ Recovers More Cells from Patient-Derived Organoids

Patient-derived intestinal organoids are precious and irreplaceable. In serum-free single-cell dissociation workflows, conventional tubes silently discard a significant fraction of cells. STEMFULL™ closes that gap.

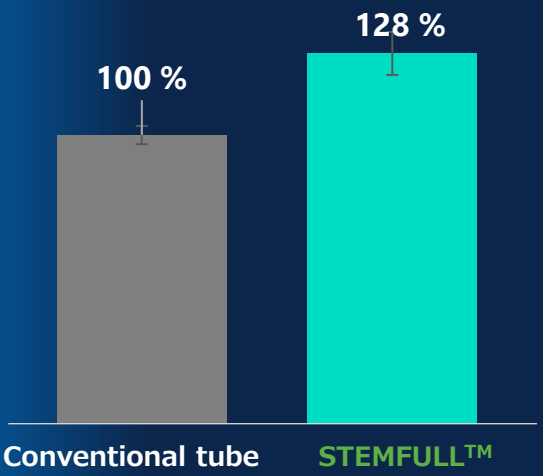
#Single-Cell Recovery | #Small intestine organoids | #Patient-Derived Organoids

CLINICAL & RESEARCH CONTEXT

As regenerative medicine research advances, cell transplantation therapy using organoids as an alternative to organ transplantation has gained attention in recent years. By transplanting organoids into the patient's body, it is expected that they can exhibit similar functions to native organs. To regenerate functional organs, a certain number of organoids are required, which need to be expanded through passaging or other methods. Furthermore, by generating single cells from organoids and performing single-cell analysis, there is potential to contribute to the elucidation of disease mechanisms such as cancer and the development of novel treatments. As organoid research progresses, there is a growing demand for efficient retrieval of rare cells through organoid passaging and single-cell analysis.

Single-cell recovery of small intestine organoids

Data provided by Professor Toshiro Sato,
Department of Medical Chemistry, Keio University School of Medicine



⚠ CRITICAL CONDITION

Serum-Free

All washes in serum-free medium — the condition where adsorption loss is most severe

🔢 RECOVERY GAIN, MORE CELLS

+28%, +13,667

More cells recovered per wash step with STEMFULL® vs. standard tube

KEY FINDING

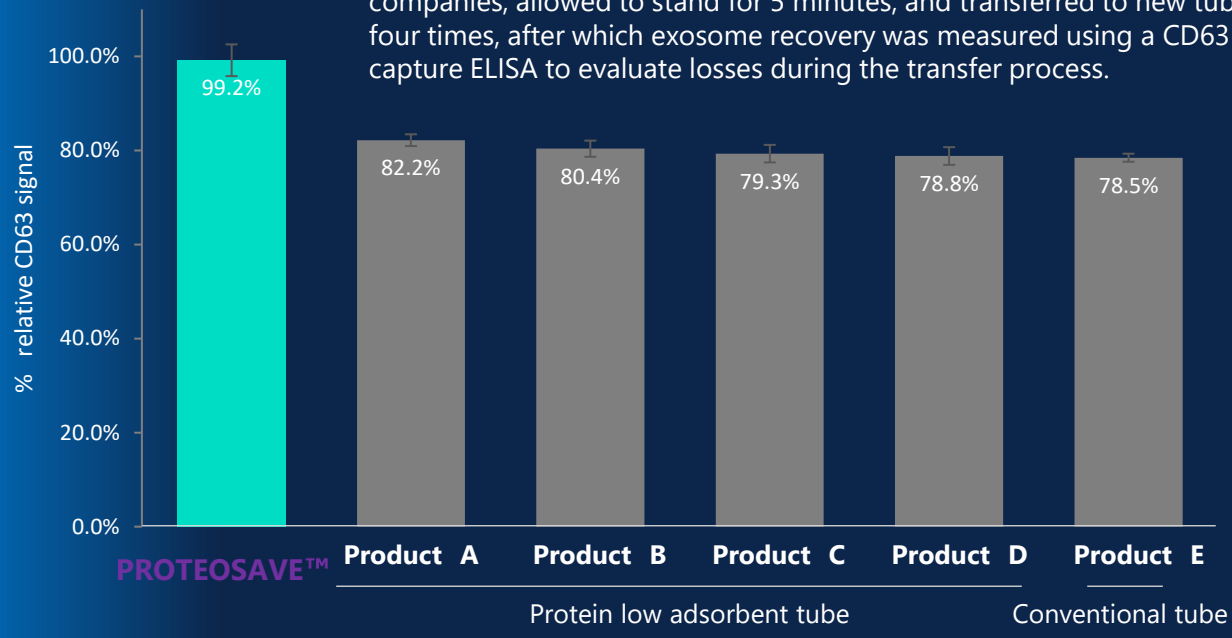
Using patient-derived small intestinal organoids dissociated to single cells in serum-free medium, STEMFULL™ 15mL consistently recovered more cells than a conventional tube. STEMFULL™'s covalent hydrophilic coating ensures that more irreplaceable cells reach downstream sequencing, drug screening, and re-seeding steps intact with serum-free conditions.

PROTEOSAVE™ Delivers Superior Exosome Recovery

Exosomes are extracellular membrane vesicles that play a critical role in intercellular signal transduction and are increasingly recognized for their involvement in cancer progression and metastasis. As exosome research expands into liquid biopsy, biomarker discovery, and drug delivery applications, efficient recovery has become a key challenge. In this application note, PROTEOSAVE™ was evaluated for exosome recovery rate and compared head-to-head against five different tubes, demonstrating superior performance across all conditions tested.

#exosome research　#Extracellular Vesicles　# liquid biopsy

Purified PC-3-derived exosomes were dispensed into tubes from various companies, allowed to stand for 5 minutes, and transferred to new tubes four times, after which exosome recovery was measured using a CD63-capture ELISA to evaluate losses during the transfer process.



#1 Highest recovery among all 6 tubes tested

VALUES USED IN THIS APPLICATION NOTE ARE MEASURED VALUES AT OUR COMPANY, NOT THE VALUES FOR GUARANTEEING.
IN ADDITION, THESE DATA DO NOT GUARANTEE THE PRODUCT PERFORMANCE UNDER ANY CONDITIONS

KEY FINDING

PROTEOSAVE™ achieved the highest exosome recovery rate among all tubes tested, outperforming five competitor low-binding tubes and a standard tube. Switching to PROTEOSAVE™ directly translates to more exosomes available for liquid biopsy, biomarker discovery, and drug delivery research — without changing your isolation protocol.

✦ READY TO SEE THE DIFFERENCE?

Your Cells Deserve a Better Tube.

PROTEOSAVE™ and STEMFULL™ have been validated across stem cells, organoids, single-cell workflows, and exosome isolation at leading research institutions.

Now it's your turn.

Cat. No	Product	Material	Qty/Pk	Qty/Cs
MS-90150	STEMFULL™ 15 mL Conical Tube	PET	5	100
MS-4255M	PROTEOSAVE™ 0.5 mL Microtube	Polypropylene	100	500
MS-4265M	PROTEOSAVE™ 1.5 mL Microtube	Polypropylene	100	500
MS-4270M	PROTEOSAVE™ 2 mL Microtube	Polypropylene	100	500
MS-52550	PROTEOSAVE™ 50 mL Conical Tube	Polypropylene	5	100

We offer a variety of other products not listed here. Please feel free to contact us for more information or inquiries.

Request a Free Sample

Try STEMFULL™ or PROTEOSAVE™ in your own workflow. Run a side-by-side comparison and see the results for yourself.

Click

Full published Application Notes

Get detailed product information and application notes. No login required.

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