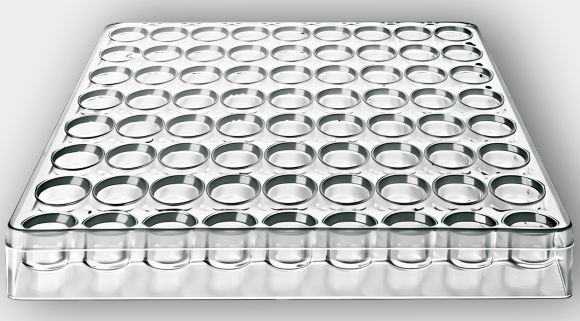
StemBond Technologies

Early Access Programme
For prospective customers and partners

Evaluate SENCE™ with your own cells in your normal workflow: a defined, synthetic surface designed to reduce hidden variability from rigid plastic and animal-derived matrices.

The SENCE™ Base Plate



What is SENCE™?

Ready-to-use plates, coverslips and inserts coated with SENCE™, a synthetic, xeno-free patented hydrogel that gives cells a more tissue-like physical environment to improve cell quality and function. Formats are designed to work with standard incubators, microscopes and plate readers.

Why teams are looking

Most labs still rely on rigid plastic or variable animal-derived coatings. That can adversely change cell behaviour, increase assay noise, create unneeded repeat work, and make translation harder than it needs to be.

Who is this for?

Biotech R&D teams, cell-therapy and process-development groups, CDMOs, advanced academic labs, and platform partners evaluating improved culture surfaces for sensitive or mechanosensitive workflows.

Why early access now?

Run a low-friction side-by-side test in your own workflow using standard products now, then discuss bespoke stiffness, ligands or format continuity where the data supports a broader rollout.

What we can offer now:

- Standard products start at £100 per unit.
- Available in 12 and 96-well plates.
- Standard stiffnesses: 0.7, 3.5, 9 and 50 kPa.
- Detailed instructions and technical support are available.
- Bespoke formats and stiffnesses can be discussed where the fit is strong.

Why customers are engaging:

- Proven technology with multiple papers published across multiple cell types
- Removes the in-house burden on niche development and fabrication
- Removes inconsistency between batches and researchers
- Provides a scalable, turn-key solution for physiological cell culture basement membranes

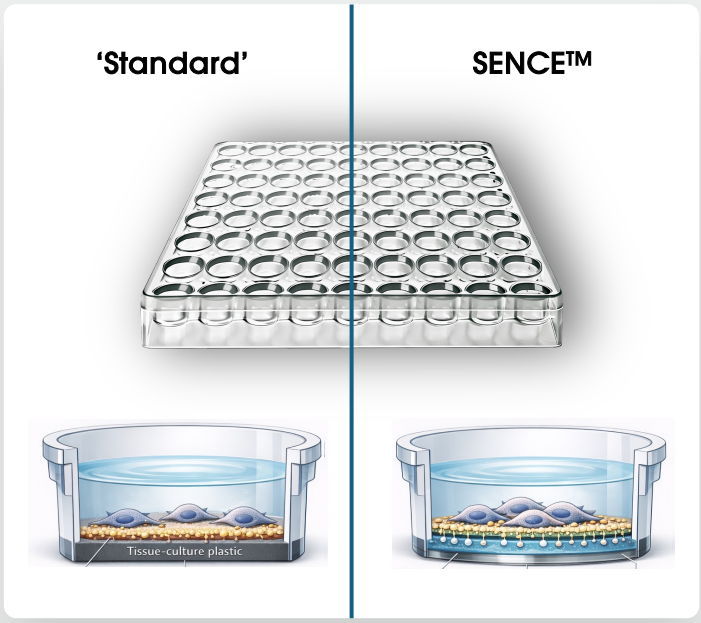
Low-friction evaluation path

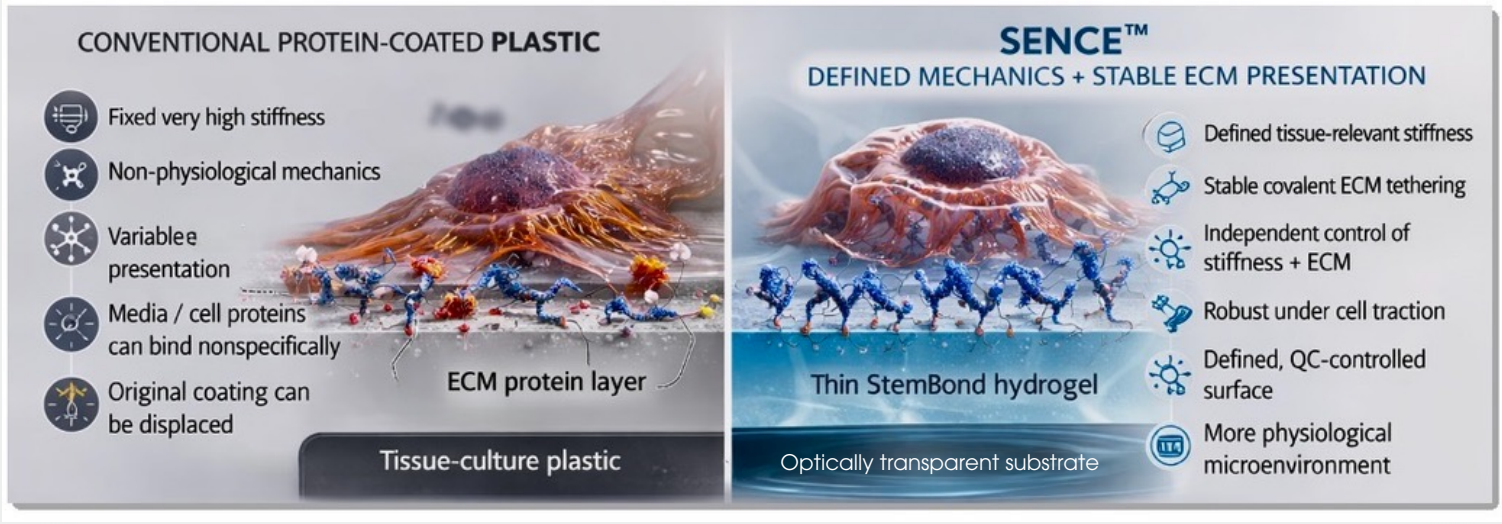
- Choose format and stiffness → run a 2–8 week side-by-side trial → review fit for repeat purchase or a broader partner discussion.
- We'll help you establish a specific niche, then lock it down as an orderable, quality-controlled consumable.

Set-up	→ Trial	→ Validate	→ Order
Agree format, stiffness during technical support call	2-8 week side-by-side evaluation against existing protocol	Review phenotype, function of cells and process fit	Establish as an orderable consumable

SENCE™ is our cell culture consumable that replaces plastic/Matrigel in existing workflows and aims to make clinical scaling easier

Standard workflow: Researchers grow cells in well plates to study disease and test new medicines and therapies.
The problem: Plastic and glass surfaces do not feel like real tissue, so cells often behave unnaturally. Researchers must add coatings or gels to make the environment more supportive, but this is time-consuming, variable, and difficult to standardise.
SENCE workflow: SENCE keeps the same familiar well plate format, but with wells pre-coated in an animal-free, quality-controlled gel that gives cells a more life-like environment.
The result: Reduced setup burden, less variability, and more realistic data.
SENCE products: Ready-to-use cell culture environments designed to mimic specific tissues, such as brain, liver, and cartilage — so researchers can focus on biology, not plate surface development and preparation.





Physiological mechanics | Stable ECM interface | Robust over multi-day culture | Defined & reprodicible | Standard workflow / imaging compatible

Why teams are already trying SENCE™

Drop in
No new equipment. SENCE is designed for familiar plates, standard incubators and routine readouts.

Synthetic
An alternative to rigid plastic and variable animal-derived matrices when reproducibility matters.

Quality
Instructions for use, support calls, lot traceability and a CoA-style quality packet are part of the product path.

Scale
Plate to insert or liner continuity is part of the partner story where scale-up pull already exists.

SENCE can recreate highly stable basement membranes, enabling clearer assays now and stronger research-to-clinic continuity later.

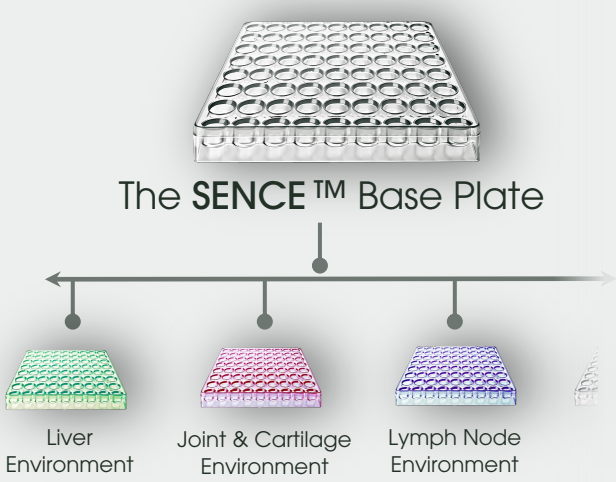
Early Access Program

Working with users to create optimised cell culture environments

SENCE™ is a synthetic cell-culture surface that replaces standard plastic with a more controlled environment, helping important cell types behave more predictably and consistently, and with greater relevance to research and development.

The Early Access Programme gives selected customers a structured way to test SENCE in their own assay and buying context, with support, documentation and a route to repeat purchase if the surface improves a workflow that matters.

We're willing to tune SENCE from its unmodified standard form to better resemble the cellular environment you want. We have previous experience with: **HSC, MSC, cholangiocytes, chondrocytes, hiPSCs, human and mouse ESCs and more**



How to start: email us to set up a discussion, request a quote or place an order

Coverslips (pack of 12; in 12-well plate)	Stiffness	EAP only Unit price
SENCE – ready for ECM	0.5 / 3.5 / 12 / 50 kPa	GBP 100

96-well plate	Stiffness	EAP only Unit price
SENCE – ready for ECM	0.5 / 3.5 / 12 / 50 kPa	GBP 100

Support & documentation

- Technical onboarding call before or after first delivery.
- Detailed instructions for use and reasonable technical support.
- Lot traceability, RUO positioning and the evolving quality packet buyers expect.
- A route to discuss bespoke formats, stiffness or future standard products.

How the EAP becomes a buying process

- Tell us your cell type, workflow, readouts and support needs.
- Choose your first delivery and run a side-by-side evaluation.
- Review whether SENCE improves performance, variance, handling or workflow fit.
- Move to repeat purchase, a bespoke request, or a wider partner discussion if the data justifies it.

StemBond Technologies

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Complete the StemBond Early Access Programme Order Form to request your first delivery. Typical buyers start with a standard SENCE evaluation, then decide whether to standardise, scale or explore a bespoke path.

Across neuro, iPSC differentiation, regeneration and HSC niche biology and beyond, SENCE turns a hard-to-control lab variable into a practical product setting.

The common thread is stable ECM presentation plus controllable mechanics.

Peer-reviewed

Segel et al., Nature 2019

OPC ageing model. Soft brain-like mechanics restored function in aged progenitors and pointed to PIEZO1 as a mechanosensitive lever.

Link

Peer-reviewed

Labouesse et al., Nature Commun 2021

PSC platform paper. Stable covalent tethering on ultra-soft gels supported mouse and human PSC attachment and state control.

Link

Peer-reviewed

Jassinskaja et al., Cell Rep 2025

Tet2-mutant HSC niche modelling. ECM-functionalised hydrogels revealed disease-selective responses that depend on physical context.

Link

Preprint

Thelwall et al. 2025 (*Development*)

Defined collagen cues improved cholangiocyte purity and function while suppressing hepatocyte carryover.

Link

Preprint

Mui et al., 2024 (*Science*)

Digit-tip regeneration paper. Soft hydrogels amplified BMP-linked regenerative ECM programmes and supported repair logic.

Link

Preprint

Raffaelli et al., 2026 (*Nature Cell Bio*)

Basement membrane mechanics drives patterned response to developmental signalling

Link

Not your exact cell type?

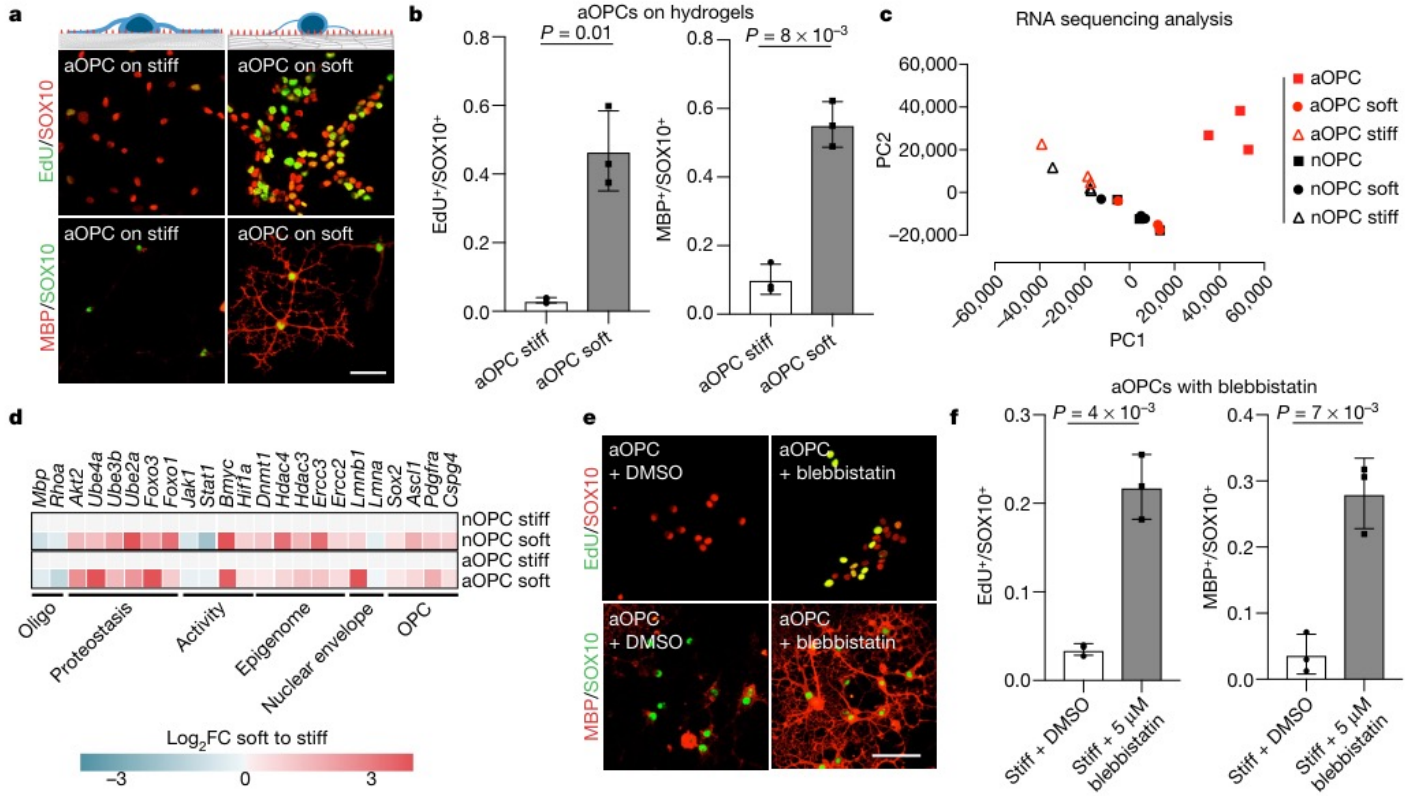
The same EAP workflow can be applied wherever mechanics and environment may alter purity, function or disease phenotype — for example, immune/Treg assays, cartilage and chondrocytes, MSC secretome/EV programmes, additional iPSC differentiation workflows, or regeneration/fibrosis models.

Each application note below is written to answer the same buyer question: what has already been shown, what is different about SENCE, and where collaboration could start quickly.

Brain ageing model | soft mechanics can override physiological age

Peer-reviewed

Segel et al., Nature (2019) — oligodendrocyte progenitor cells (OPCs) and CNS ageing



Representative figure from the referenced study.

Background

The ageing CNS stiffens, while oligodendrocyte progenitor cells lose regenerative capacity.

The key question in the paper was whether mechanics alone can drive that loss of function, independent of media changes or undefined matrices.

What the paper showed

- StemBond SENCE™ hydrogels mimicked young-like versus aged-like brain stiffness while keeping the rest of the culture environment controlled.
- Aged OPCs regained proliferation and differentiation on soft, brain-like substrates; young OPCs lost function on stiff substrates.
- The study implicated PIEZO1-mediated mechanosensing as an upstream lever.

Why SENCE was essential

SENCE was crucial because it isolated tissue stiffness from protein coating effects, allowing the study to show that brain-like softness itself can restore more youthful OPC behaviour.

Why SENCE differentiates

- Stable soft substrates for multi-day CNS assays — not just rigid plastic or fragile DIY gels.
- Lets teams ask whether mechanics, rather than media complexity, explains phenotype drift.
- Productises a "young vs aged tissue" variable as a defined surface setting.

Best EAP collaboration fit

- OPC / glia / remyelination studies
- Neurodegeneration, ageing and repair models
- CRISPR, drug or pathway screens where a physiologic soft niche could change the answer

PSC workflows | ultra-soft culture without unstable coatings

Peer-reviewed

Labouesse et al., Nature Communications (2021) — StemBond hydrogels for mouse and human PSCs

Background

Pluripotent stem cell workflows often need very soft substrates, but conventional PAAm + sulfo-SANPAH can have weak or variable ECM tethering.

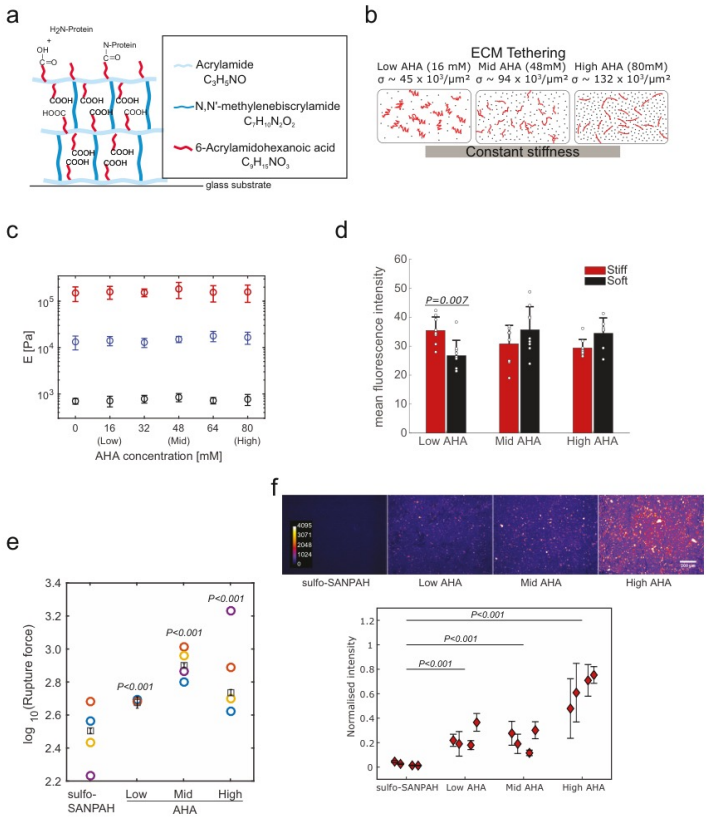
That makes attachment, interpretation and cross-site reproducibility difficult.

What the paper showed

- StemBond introduced AHA-enabled covalent tethering, so ECM tethering strength can be tuned independently of stiffness.
- Compared with sulfo-SANPAH, StemBond showed stronger ECM tethering and greater surface stability on soft gels.
- The platform supported mouse and human PSC attachment, and soft substrates increased naïve-state markers / self-renewal signals.

Why SENCE was crucial:

SENCE made ultra-soft stem-cell culture usable by holding ECM proteins stably on the surface, allowing pluripotent stem cells to attach reliably and making softness-driven biology interpretable rather than confounded by coating failure



This figure shows why the StemBond surface is useful for pluripotent stem cells. The authors created very soft culture surfaces that better resemble early developmental tissue, while ensuring the protein coating was held firmly and consistently on the gel surface. This matters because stem cells are highly sensitive to how proteins are presented: if the coating is weak or unstable, cell attachment and behaviour become less reliable. The figure therefore supports the key message that StemBond provides not just a softer environment than standard plastic, but a softer environment with a more stable and controlled protein interface.

Representative figure from the referenced study.

Why SENCE differentiates

- Direct validation of the core chemistry behind SENCE, not just a downstream use case.
- Removes a major confounder in soft-gel work: changing stiffness no longer silently changes coating robustness.
- Turns expert-only ultra-soft substrate prep into repeatable cultureware.

Best EAP collaboration fit

- mESC / hPSC / hiPSC maintenance
- Naïve-state studies and reprogramming workflows
- Early lineage-decision screens where attachment quality and substrate softness both matter

iPSC differentiation purity | cleaner lineage commitment and higher-function progeny

Preprint

Thelwall et al., draft / preprint — collagen-rich StemBond directs hiPSC cholangiocyte differentiation

Background

Directed iPSC differentiation often yields mixed progeny: desired cholangiocyte-like cells plus residual hepatocyte-like carryover.

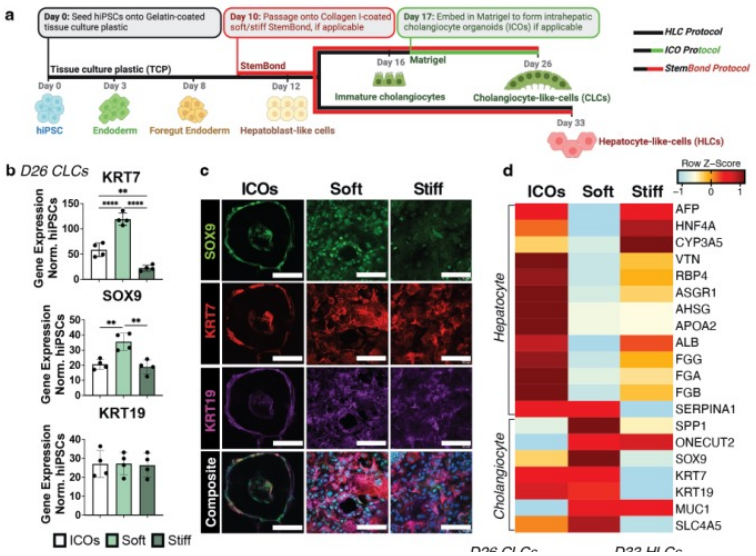
When matrix cues are poorly defined, it is hard to tell whether purity problems come from protocol biology or from the substrate.

What the paper showed

- Collagen-I rich StemBond SENCE™ hydrogels increased biliary markers KRT7, SOX9 and KRT19 during cholangiocyte differentiation.
- In parallel, hepatic markers ALB, AFP and SERPINA1 were strongly suppressed, and CYP3A4 activity fell versus hepatocyte controls — indicating reduced off-target hepatic carryover.
- Collagen-rich conditions also increased cholangiocyte-associated GGT activity, linking cleaner lineage commitment to higher-function progeny.

Why SENCE was crucial:

SENCE provided a defined, mechanically controlled, collagen-presenting surface that helped reduce off-target hepatocyte features and support cleaner, more functional cholangiocyte progeny from iPSCs.



This figure shows how human iPSCs (induced pluripotent stem cells) were differentiated into ICOs (intrahepatic cholangiocyte organoids, or bile-duct-like structures) and how substrate mechanics shaped the outcome. The top schematic outlines the route from iPSCs through DE (definitive endoderm), FP (foregut progenitors), and IHBD (intrahepatic biliary ductal cells) before maturation on soft or stiff hydrogels. The images on the left show staining for KRT7 and KRT19 (keratin 7/19) and SOX9, all markers of biliary identity, with stronger cholangiocyte features in the ICO and soft conditions. The heatmap on the right shows higher cholangiocyte-associated gene expression in ICOs and soft conditions, while hepatocyte-associated markers such as AFP (alpha-fetoprotein), ALB (albumin), CYP3A4, and HNF4A are relatively higher in the stiff condition. Overall, the figure suggests that a softer, more tissue-like environment supports cleaner cholangiocyte differentiation and reduces unwanted hepatocyte-like features.

Representative figure from the referenced study.

Why SENCE differentiates

- Frames SENCE as a purity-and-function control knob in iPSC differentiation, not just a culture substrate.
- Defined collagen presentation and mechanics replace variable matrix exposure from Matrigel-heavy workflows.
- Converts a differentiation bottleneck into a plate-compatible side-by-side evaluation teams can actually run.

Best EAP collaboration fit

- hiPSC / PSC differentiation purity screens
- Cholangiocyte, bile-duct and hepatobiliary programmes
- Process-development work where lineage output and function need to be measured together

Early Access Program

Application Note

Developmental signalling | mechanics changes how hPSCs read BMP4

Ra'aelli et al., bioRxiv (2026) - basement membrane mechanics drives patterned response to developmental signalling

Preprint

Background

Human pluripotent stem cell colonies are widely used to model early development, but morphogen response is usually treated as a signalling-only problem.

This study asked whether basement-membrane mechanics also controls which cells are competent to respond to uniformly applied BMP4.

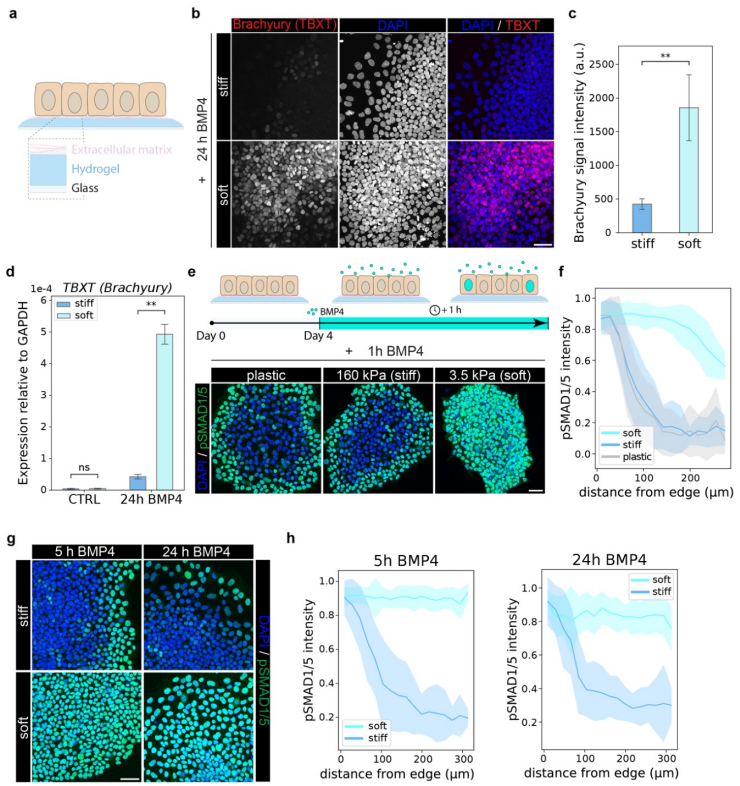
What the paper showed

- On soft StemBond SENCE™ hydrogels, hPSC colonies lost the usual edge-restricted BMP4 response and instead responded across the colony, increasing TBXT / Brachyury mesoderm induction.
- The mechanism tracked to reduced FAK-PI3K mechanosensing, weaker junctions and disrupted apico-basal polarity, which increased BMP receptor accessibility.
- Apical laminin phenocopied the soft-gel state, and softening the mouse embryo basement membrane triggered premature ectopic mesoderm in vivo.

Why SENCE was crucial

SENCE was essential because it let the authors change substrate stiffness while keeping the cell-adhesive surface defined and stable, so the altered BMP4 response could be attributed to mechanics rather than coating variability.

Figure 1. hPSCs on soft substrates lose spatially patterned response to BMP4



Human pluripotent stem cell colonies cultured on soft SENCE hydrogels show loss of the normal edge-restricted response to BMP4. Compared with stiff substrates and plastic, soft hydrogels produce broader colony-wide pSMAD1/5 signalling after BMP4 exposure, followed by significantly higher induction of TBXT/Brachyury, an early mesoderm marker. The figure therefore shows that lowering substrate stiffness changes how hPSCs interpret the same biochemical signal, shifting BMP4 response from a spatially patterned edge effect to a stronger, more widespread differentiation response across the colony.

Representative figure from the referenced study.

Why SENCE differentiates

- SENCE isolates mechanics while keeping ECM presentation stable, so signal-patterning effects are not confounded by weak or drifting coatings.
- It turns developmental response patterning into a configurable plate-based variable rather than a bespoke gel build.
- The same logic can extend into other PSC, epithelial or morphogen-driven systems where competence is the bottleneck.

Best EAP collaboration fit

- hPSC / hiPSC micropattern, gastruloid and morphogen-response assays
- Early lineage specification and developmental toxicology workflows
- Epithelial polarity, barrier and basement-membrane remodelling studies where mechanics may change signal response

Regeneration / fibrosis models | soft, HA-rich mechanics bias repair toward regeneration

Preprint

Mui et al., bioRxiv (2024) — hyaluronic acid, wound mechanics and digit tip regeneration

Background

Digit-tip repair is a clean model for the difference between regeneration and fibrosis. But in standard culture, ECM composition and mechanics are often collapsed into one uncontrolled variable.

This paper asked whether the physical state of the wound niche can itself push cells toward regenerative or fibrotic behaviour.

What the paper showed

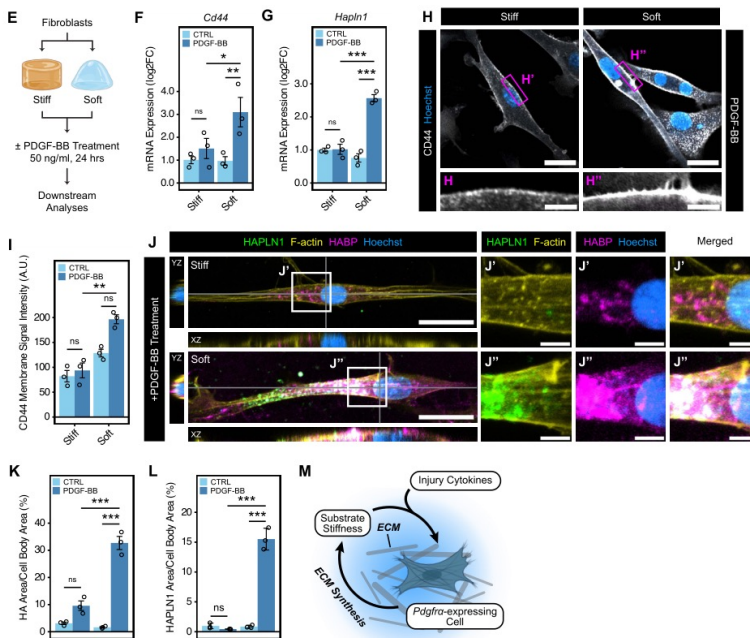
• Non-regenerative wounds were collagen-rich and stiffer, whereas regenerating blastemas were hyaluronic-acid rich and mechanically softer / more fluid.

• Using soft and stiff StemBond SENCE™ hydrogels to model these states, the study showed soft substrates increased BMP-response intensity and boosted Cd44/Hapln1-linked regenerative ECM assembly.

• In vivo, HAPLN1 overexpression promoted hyaluronic acid accumulation, reduced fibrosis and initiated rescue of non-regenerative amputations.

Why SENCE was crucial:

SENCE allowed regenerative versus fibrotic tissue mechanics to be recreated in a controlled way, making it possible to test how stiffness directly shapes ECM remodelling and pro-regenerative signalling.



Fibroblasts cultured on SENCE hydrogels that mimic fibrotic versus regenerative digit-tip mechanics show that substrate stiffness directly shapes the extracellular matrix programme. In the stiff condition, cells spread more and assemble prominent collagen- and THBS4-rich fibrillar matrix, consistent with a scar-forming, non-regenerative response. In the soft condition, this fibrosis-like matrix assembly is markedly reduced, supporting the idea that a softer microenvironment helps preserve a more regenerative state. The figure highlights a key value of SENCE: it enables wound-healing and regeneration biology to be studied in a defined system where tissue mechanics can be controlled independently, rather than being hidden within standard plastic culture.

Representative figure from the referenced study.

Why SENCE differentiates

• Links surface mechanics directly to regeneration-versus-fibrosis decisions, not just cell attachment.

• Gives collaborators a defined platform to test pro-regenerative ECM cues, BMP responsiveness or anti-fibrotic interventions side-by-side.

• Extends SENCE beyond "cell growth" into decision-grade wound-healing and repair assays.

Best EAP collaboration fit

• Fibroblast, stromal and wound-healing assays

• Regeneration / fibrosis and bone-repair model developers

• Pathway, cytokine or ECM screens where matrix state may flip the biology

HSC niche assays | disease-selective ECM effects in a defined physical context

Jassinskaja et al., revised preprint — Tet2-mutant HSC biology and ECM-functionalised StemBond hydrogels

Peer-reviewed

Background

The study's multi-omic analysis identified extracellular-matrix dysregulation in Tet2-mutant pre-leukaemic HSCs.

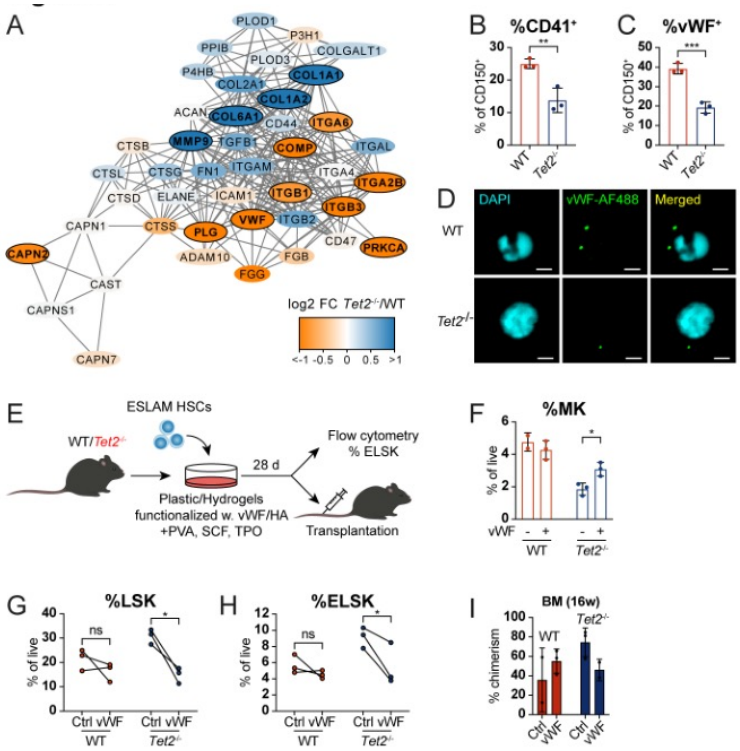
That creates a practical need for long-duration, niche-defined assays — not just transcriptomic inference.

What the paper showed

- ECM-functionalised StemBond SENCE™ hydrogels were used in 28-day HSC culture with transplantation readouts.
- Niche-anchored vWF acted as a negative regulator of Tet2-mutant HSC expansion, while WT behaviour differed.
- The result was a disease-selective assay in which ligand identity and physical presentation both mattered.

Why this matters now

SENCE was crucial because it enabled long-duration, ECM-defined blood stem cell culture in plate format, revealing that stem-cell maintenance depends on both the ligand used and how that ligand is physically presented.



Defined ECM presentation on SENCE reveals that blood stem cell fate depends on both the matrix cue and the physical context in which it is presented. In this study, WT and Tet2-mutant ESLAM HSCs were cultured for 28 days on soft, ECM-functionalised StemBond hydrogels, where niche-anchored von Willebrand factor (vWF) selectively reduced the expansion of mutant primitive progenitors and HSCs, while having little effect on WT cells. The figure highlights a key advantage of SENCE: it enables long-duration, plate-based niche assays in which specific extracellular matrix molecules can be presented in a stable, mechanically defined environment, making it possible to uncover disease-relevant biology that would be masked or altered on standard rigid plastic.

Representative figure from the referenced study.

Why SENCE differentiates

- Long-duration, ECM-defined niche assays in a plate-compatible format.
- Useful wherever genotype, stemness and lineage output depend on microenvironment quality.
- Moves "hard assays" out of one-off custom gel builds and into something collaborators can repeat.

Best EAP collaboration fit

- HSC / HSPC expansion or disease models
- Bone-marrow niche and pre-leukaemia biology
- Transplantation or gene-editing workflows where preserving primitive fractions matters

Work with us!

If your cell type is not published in a paper yet, that is exactly what the EAP is for

The papers above prove the platform principle. The Early Access Programme turns that principle into decision-grade data in your own assay.

Next step

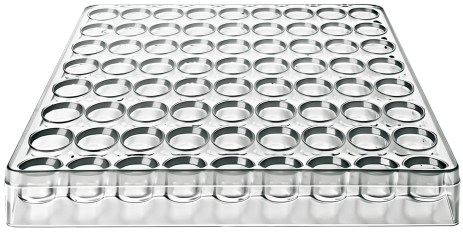
A simple collaboration path

1. **Scope the workflow**
   Cell type, current substrate, decision readouts, and what "better" would mean in your assay.

2. **Configure SENCE**
   Format, stiffness band, and coating / ligand guidance chosen to keep the first trial practical and comparable.

3. **Run a side-by-side evaluation**
   Joint review of phenotype, function, variability, handling and process fit, then decide repeat purchase, a bespoke path or wider partnership.

We'll help to establish your ideal niche



- Immune and Blood cells
- Osteochondral cells
- MSCs
- iPSCs
- Regeneration / fibrosis models
- **YOUR CELLS**

Typical EAP readouts

- phenotype / purity / viability
- morphology / lumen / branching
- assay variance and reproducibility
- secretome or lineage output
- handling, throughput and workflow fit

Closing Message

Through the EAP, we are excited to learn more about the issues with current cell culture and be part of the solution. Where we don't have existing environments, we're eager to work with teams to develop the niches that are needed most and will, ultimately, have the greatest benefit on patient outcomes.