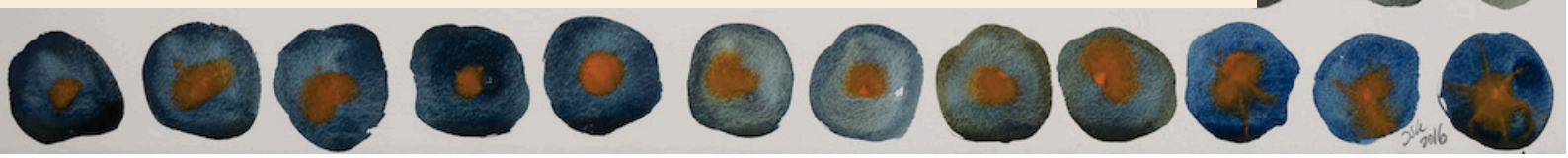
BioLamina

Next generation mesenchymal stromal cell culture

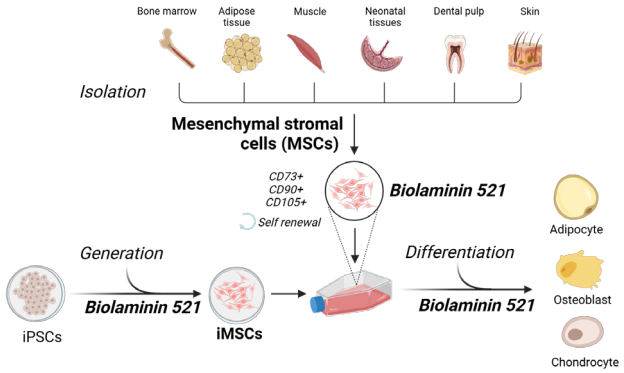
with Biolaminin® 521



Full-length Biolaminin 521 enables biorelevant and standardized MSC culture

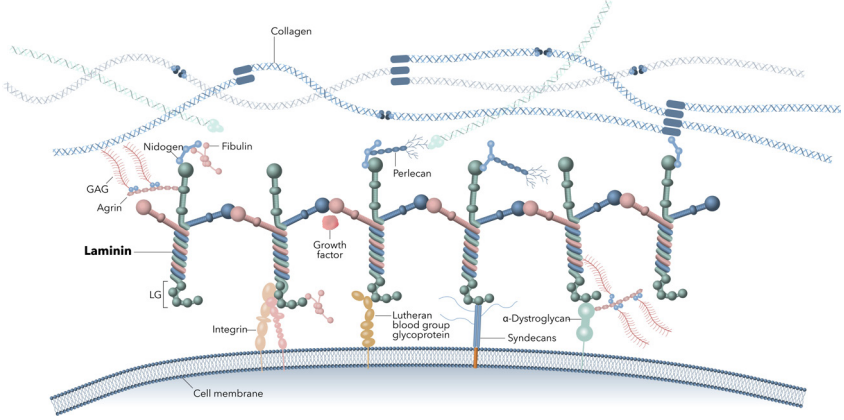
Mesenchymal stromal cells (MSCs) are adherent cells widely studied in immunomodulatory and regenerative medicine, with applications in clinical trials for graft-versus-host disease, autoimmune disorders, and tissue repair. Primary MSCs can be isolated from various tissues such as bone marrow, adipose tissue, and umbilical cord, but donor heterogeneity and source availability remain key challenges. To address these limitations, protocols for deriving MSC-like cells from induced pluripotent stem cells (iPSCs), known as iMSCs, have been developed [Figure 1] [1]. This approach offers a renewable, standardized cell source, potentially improving reproducibility and clinical translation. The identity and function of MSCs are highly influenced by their microenvironment, including interactions with the extracellular matrix (ECM). Laminin-521 is a key ECM protein, in both pluripotent and adult stem cell niches. Recombinantly produced full-length Biolaminin 521 enhances primary MSC proliferation and supports iMSC culture, from generation to downstream differentiation enabling standardized protocols [2] and clinical applications.

FIGURE 1
Biolaminin 521 supports in vitro generation, proliferation, and differentiation of MSCs



MSCs are isolated from different primary sources or generated from pluripotent stem cells (iMSCs). MSCs are adherent cells expressing CD73, CD90 and CD105, characterized by the ability to differentiate into adipocyte, chondrocyte and osteoblast lineages [3]. [Image created with Biorender]

FIGURE 2
Full-length laminins are crucial components in creating the stem cell niche *in vivo* and *in vitro*



BENEFITS

- Long-term and stable expansion of MSCs
- Supports iMSC generation
- Uniform differentiation response
- Enables serum-free culture
- Compatible with small-to-large scale culture system

FEATURES

- Mimics cell microenvironment supporting primary cells isolation
- Seamless transition from basic research to clinical application

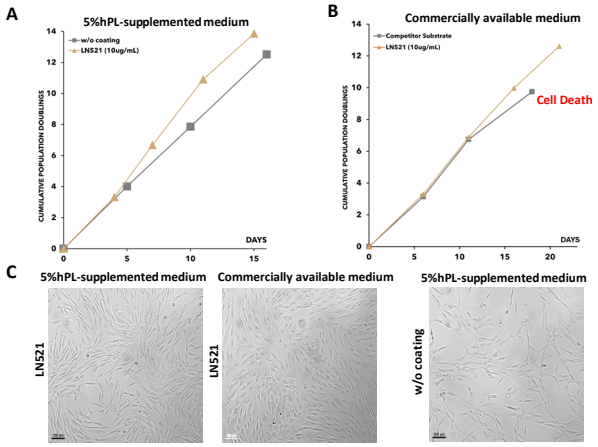
Curious about cell culture? Scan to find out more

Laminins are basement membrane proteins within the extracellular matrix (ECM) found throughout the body. Full-length laminins play a structural and functional role in the *in vivo* stem cell niche, promoting stable cell identity, self-renewal capacity, and survival [4]. Full-length recombinant human Biolaminin 521 is a chemically defined culture substrate that mimics the *in vivo* microenvironment.

ID: BG-009-02. Valid from 2025-04-28

FIGURE 3

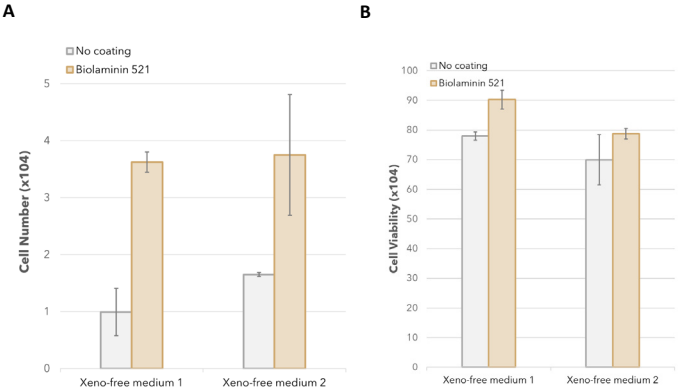
Fast expansion of human primary adipose-derived (Ad)-MSCs on full-length Biolaminin 521 in xeno-free conditions



(A) Representative growth curves of human primary Ad-MSCs on Biolaminin 521 (LN521, orange lines) cultured in xeno-free conditions using 5% hPL-supplemented medium or (B) a commercially available medium. Cells on competitor substrate could not be maintained after passage 3. (C) Light microscopy pictures of primary Ad-MSCs on LN521 cultured in xeno-free conditions (day 4 and 5, respectively) show homogeneous MSC morphology vs w/o coating condition (day 5). Data courtesy of Claudia Lobato Lab.

FIGURE 4

Large scale expansion of primary Ad-MSCs on Biolaminin 521 in xeno-free conditions

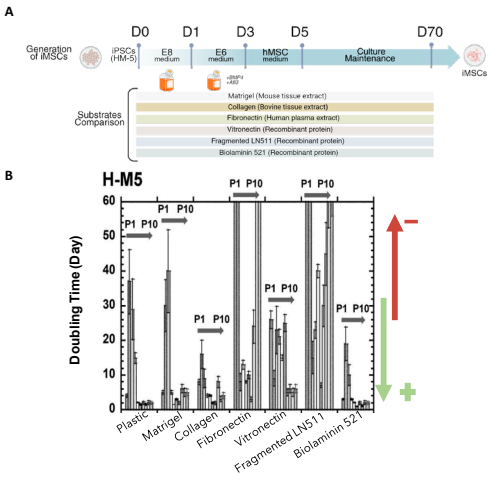


(A) Ad-MSCs (p3) showed a 2.27- to- 3.65-fold increase in growth when cultivated on Biolaminin 521-coated FlexiGrow™Carroucell microcarriers compared to uncoated microcarriers. The data are reproducible across two different xeno-free media. (B) Cell viability increased by 10-20% on Biolaminin 521-coated FlexiGrow™ Carroucell microcarriers compared to uncoated microcarriers. Data generated by Carroucell.

Full-length Biolaminin 521 supports iMSC cell culture from generation to downstream differentiation

FIGURE 5

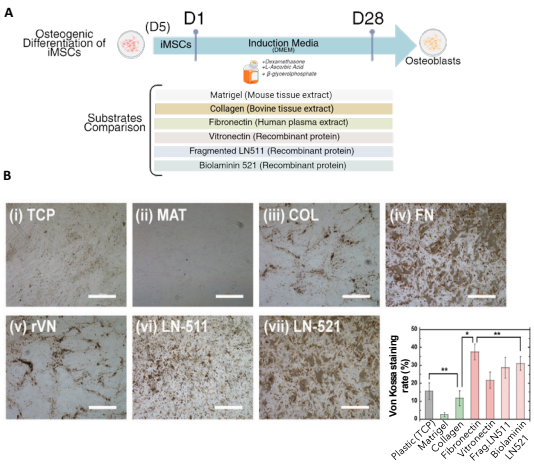
Full-length Biolaminin 521 supports fast and stable expansion of iPSC-derived MSCs (iMSCs)



A) Schematic protocol for the generation of iMSCs comparing different cell culture substrates. Cells were maintained on coating substrates throughout the protocol (Created with Biorender) [Adapted from 2]. B) Full-length Biolaminin 521 allows fast and stable proliferation, reducing time between passages (p1 to p10). The beneficial advantages of full-length Biolaminin 521 over fragmented laminin 511 is particularly pronounced [2].

FIGURE 6

Full-length Biolaminin 521 promotes uniform and efficient osteogenic differentiation of iMSCs



A) Schematic protocol for iMSCs differentiation to osteoblast comparing different cell culture substrates (Created with Biorender) [Adapted from 2]. B) Biolaminin 521 ensures uniform differentiation and increases calcium-phosphate deposition compared to controls, measured by von Kossa staining on respective substrates. Bar plots show staining quantification after 28 days of differentiation [2].

REFERENCES

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