BioLamina
REVOLUTIONIZING CELL CULTURE

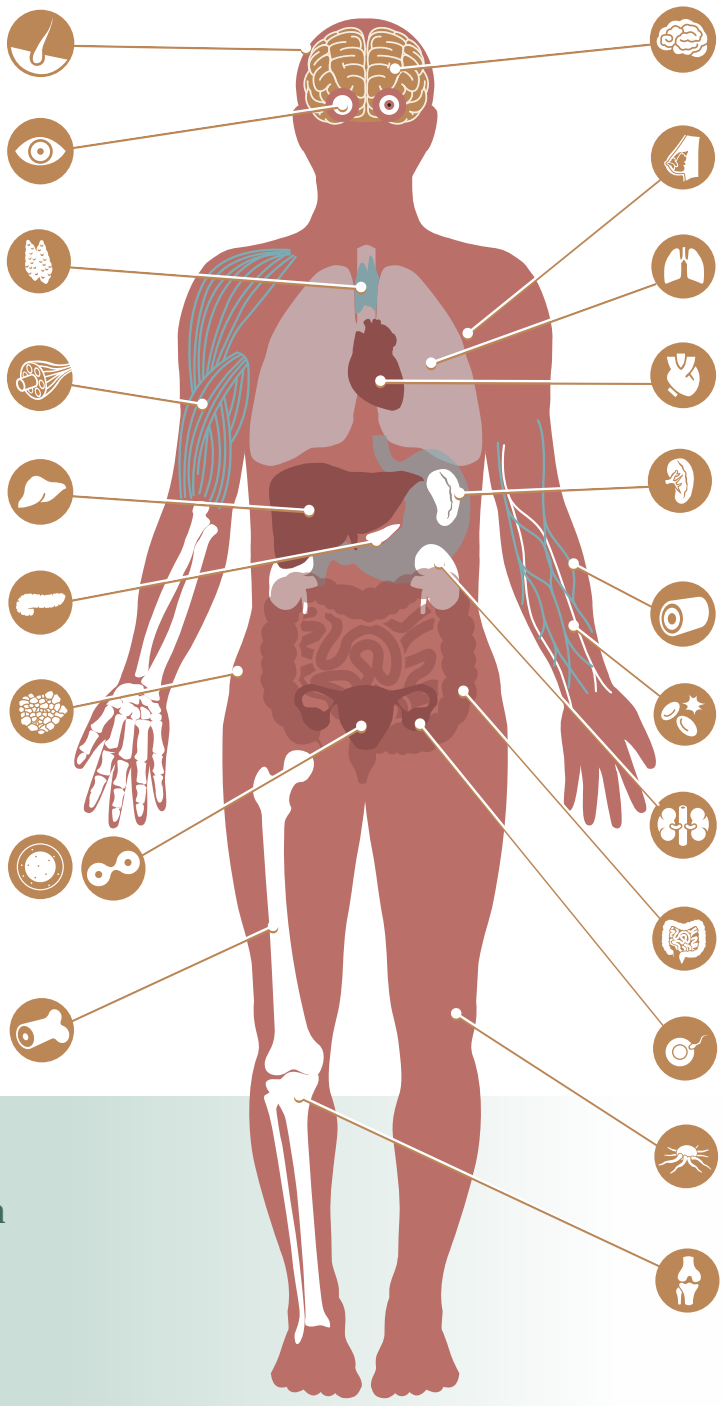
# Tissue-specific cell culture matrices

## Imitate the natural cell-matrix interactions for improved cell functionality

The chemically defined and animal origin-free laminin cell culture matrices, Biolaminin®, allow you to imitate the natural cell-matrix interaction in vitro. Laminins are key components of the extracellular matrix. Through their interactions with specific receptors, laminins trigger the authentic cellular responses, pivotal for cell anchorage, survival, proliferation, migration, organization and specialization, leading to improved cell functionality.

We offer an expansive portfolio of recombinant laminin proteins for a variety of applications, including reliable expansion of pluripotent cells and differentiation and maintenance of specialized cell types

**Read more about different cell applications for our Biolaminins**



### Epithelial Cells
Hair follicle stem cells - LN521, LN332
Keratinocytes - LN511, LN521, LN332

### Ocular Cells
Retinal pigmented epithelial cells - LN521
Human corneal endothelial cells - LN521, LN511
Photoreceptors - LN332, LN532, LN521

### Thymus Gland Cells
Thymocytes & T cells - LN411, LN332, LN211

### Muscle Cells
Myogenic stem cells & progenitors - LN521
Myocytes - LN211, LN521, LN221

### Hepatic Cells
Hepatocytes - LN521, LN111
Cholangiocytes - LN521, LN111, LN411, LN221

### Pancreatic Cells
Insulin producing cells - LN521, LN421, LN411
Primary pancreatic islet cells - LN521, LN411

### Fat Cells
Adipocytes - LN411

### Pluripotent Stem Cells
Derivation and expansion of hESC - LN521
Reprogramming and expansion of iPSC - LN521
hESC and iPSC clonal culture - LN521

### Mesenchymal Stem Cells
Expansion of MSC - LN521, LN411, LN332

### Neural Cells
Neurons - LN521, LN111, LN211, LN511, LN411
Glial cells - LN521, LN211, LN111, LN411
Neural stem cells - LN521

### Mammary Gland Cells
Mammary epithelial cells - LN521, LN511, LN111

### Pulmonary Cells
Bronchial epithelial cells - LN521, LN511, LN111

### Cardiac Cells
Cardiomyocytes - LN521, LN221, LN211

### Splenic Cells
Splenic Endothelial Cells -LN521
Mesothelial cells - LN521

### Endothelial Cells
Vascular endothelial cells -LN411, LN521, LN421, LN511
Retinal endothelial cells - LN411, LN521, LN421, LN511
Vascular endothelial cells - LN521, LN411, LN511

### Hematopoietic Stem Cells & Blood Cells
Maintenance of HSC - LN521, LN421, LN411
Megakaryocytes - LN521

### Renal Cells
Glomerular endothelial cells - LN521, LN411, LN111
Tubular epithelial cells - LN521
Podocytes - LN521
Mesangial cells - LN421

### Intestinal Cells
Intestinal epithelial cell - LN511, LN521, LN111

### Reproductive System
Ovary - LN521
Testis - LN211, LN221

### Cancer Stem Cells
Glioblastoma - LN521
Breast cancer - LN511

### Bone & Cartilage Cells
Bone - LN521
Cartilage - LN521, LN421

## Main advantages of using Biolaminin

- Improved cell performance
- Reproducible and reliable results
- Effective specialization
- High quality and yield
- Standardized and clinically compliant

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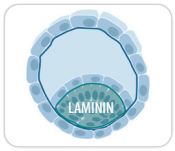
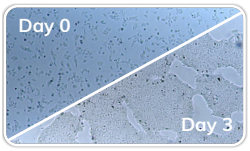
# Highlighted Biolaminin applications

## Robust self-renewal of high quality hPSCs on the Biolaminin 521 stem cell matrix

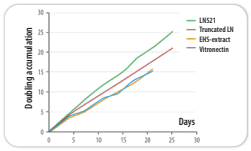
Laminin-521 is a key cell adhesion protein of the natural stem cell niche. The Biolaminin 521 (LN521) substrate supports efficient expansion at low densities of single-cell plated human pluripotent stem cells (hPSCs) under defined and animal origin-free conditions. LN521 is compatible with any medium and supports weekend-free feeding. Importantly, the cells behave predictably, are homogenously pluripotent and karyotypically stable.



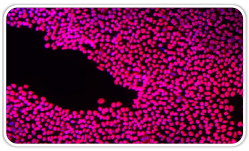

LN521 is naturally expressed and secreted by hPSCs in the inner cell mass of the embryo.



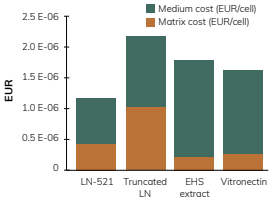

hPSCs can be seeded as single cells without ROCKi (day 0), grown as a homogenous monolayer (day 3) and can be cultured to high confluence without spontaneous differentiation.




hPSCs propagate faster on LN521 compared to other feeder-free matrices.



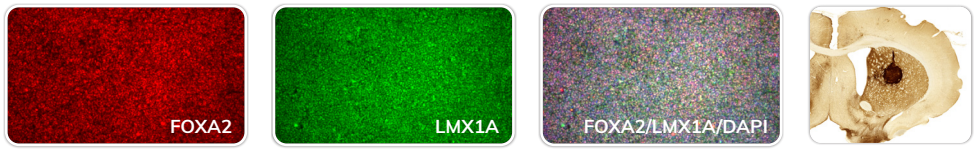
The hPSCs remain pluripotent (Oct4+; pink) and show no areas of differentiation (only DAPI staining; blue).




Due to faster growth rate and higher cell yield, the total cost per cell and passage is lowest for LN521 compared to other feeder-free matrices.

## Biolaminin 111 generates high yield of clinically compliant dopaminergic neurons

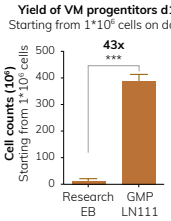
Biolaminin 111 (LN111) supports efficient, GMP compliant differentiation of a homogenous population of hPSC-derived dopaminergic (DA) progenitor cells. Compared to embryoid bodies (EB)-based protocols, the yield of DA progenitors is >40x on LN111. Starting from a single 6-well plate of hESCs, DA progenitor cells can be produced on a scale suitable for clinical production.




The DA progenitors homogenously express the predictive markers FOXA2 (red) and LMX1A (green).



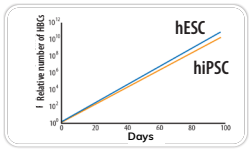
The cells become TH+ neurons at the site of transplantation in rats.



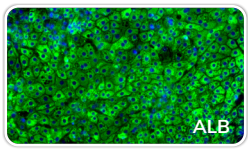

43-fold increase in yield of DA progenitors from human ES cells differentiated on LN111, compared to standard EB-based protocols.

## Biolaminin 521 and 111 support hPSC-derived hepatocyte differentiation and self-organization

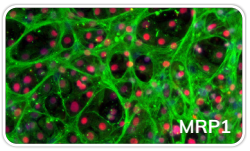
Human ES cells differentiated on Biolaminin 521 (LN521) and 111 (LN111) demonstrate efficient hepatocyte maturation and cell organization with significant improvements in cell function and stability of phenotype. The cells form canalicular-like structures, express multidrug resistance protein 1 (MRP1) and 2 (MRP2) and are capable of biliary efflux. The cell organization is coherent with the enhanced cellular function.



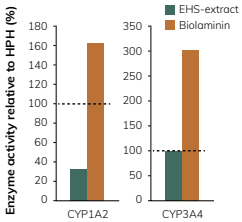

Efficient clonal expansion and maintenance of hESC- and hiPSC-derived hepatoblast-like cells (HBCs).




High ratio of hepatocyte-like cells express albumin (ALB; green).

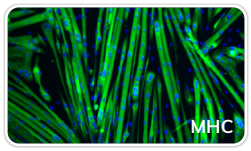



The cells are highly organized and express transporter protein MRP1 (green).




Large increase in P450 metabolic enzyme activity compared to cells on Engelbreth-Holm-Swarm (EHS) mouse sarcoma extract or human primary hepatocytes (HPH; dotted line).

## Biolaminin 521 maintains satellite cell-derived myoblast differentiation potential long-term




Biolaminin 521 (LN521) supports superior muscle cell performance in vitro by dramatically improving muscle cell proliferation and differentiation performance, with larger myotubes and higher amounts of nuclei per myotube. Importantly, LN521 supports more consistent and reliable differentiation over long-term culture, and without altering the traditional Pax7/MyoD paradigm.

The cells form myotubes after 8 passages on LN521. Myosin heavy chain expression (MHC; green).

## REFERENCES:


**hPSCs**
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- Monolayer culturing and cloning of human pluripotent stem cells on laminin-521 based matrices under xeno-free and chemically defined conditions. Rodin *et al.*, Nat Prot., 2014

**DA neurons**
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- Efficiently Specified VM DA Neurons From Human PSCs Under Xeno-Free Conditions Restore Motor Deficits in Parkinsonian Rodents. Niclis *et al.*, Stem Cells Transl Med., 2017

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- Long-Term Self-Renewal of Human ES/iPS-Derived Hepatoblast-like Cells on Human Laminin 111-Coated Dishes. Takayama *et al.*, Stem Cell Reports, 2013

**Skeletal muscle**
- Laminin 521 maintains differentiation potential of mouse and human satellite cell-derived myoblasts during long-term culture expansion. Penton *et al.*, Skeletal Muscle, 2016


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