

Generation of hPSC-derived neural crest cells on Biolaminin 521

Biolaminin 521 is a full-length, human, recombinant laminin 521 cell culture substrate. It provides an optimal environment for feeder-free culture of human PSCs under chemically defined, animal origin-free conditions. Biolaminin 521 can support Neural Crest (NC) induction from hPSCs using STEMdiff™ Neural Crest Differentiation Kit and can replace the undefined coating material (EHS extracts). The yield of NC cells can be used for further differentiation as desired. Biolaminin 521 is available both in research grade and cell Therapy Grade (CTG).

Biologically relevant culture environment

Laminin 521 is a key basement membrane protein of the natural stem cell niche, expressed and secreted by human pluripotent stem cells (hPSCs) in the inner cell mass of the α5 preimplanted embryo. Laminin 521 has a strong interaction with the $\alpha 6\beta$ 1integrin, a key mediator of signaling pathways that regulate, survival, **B**2 proliferation, migration, and differentiation and promotes survival and efficient long-term self-renewal.



Neural crestal cells

Neural crest cells (NCCs) are multipotent and arise at the posterior and lateral borders of the neural and non-neural ectoderm and the neural plate border. NCCs can give rise to several cell types based on the site of origin along the anteroposterior axis of the embryo and divides to cranial, trunk, vagal and sacral NCCs.

FIGURE 1

Neural crest origin and regions in human and mouse embryos

FEATURES AND SPECIFICATIONS

- Crest Differentiation Kit (STEMCELL Technologies)
- Compatible with human ES and iPS cells maintained in mTeSRTM1/ mTeSR[™] Plus and TeSR[™]-E8[™] (STEMCELL Technologies)

- Defined- and xeno-free culture substrate



Direct link to neural crest instructions



Neural crest cells (green) migrate through the embryos, their direction of migration shown in black arrows. The migration of neural crest is depending on their axial level of origin and migratory pathways. Neural crest cells adopt different fates and contribute to various tissues and organs. [1]

On Biolaminin 521 substrate



FIGURE 2

In vitro derivation of human NCCs and examples of important applications from hPSCs



Overview of in vitro hPSC-derivation of human NCCs and examples of potential applications in regenerative medicine and disease modeling.[2]

FIGURE 3

Neural crest cells generated on Biolaminin 521 substrates shows high population of neural crest cells



After 6 days in culture, a high purity of NCCs (A-F) was achieved with all cells expressing the NCC marker CD271 (E, green) without the expression of PAX6+ neuronal progenitor cells (F, red; A, C merged). Cell seeding density: 2 x 105/cm². Biolaminin 521 coating (5µg/ml). BF=Brightfield (A).





REFERENCES

[1] Méndez-Maldonado et al. Front Cell Dev Biol, 2020. Neurogenesis From Neural Crest Cells: Molecular Mechanisms in the Formation of Cranial Nerves and Ganglia.

[2] Akshaya and Yi-Chin, Front Mol Neurosci, 2019.Human Pluripotent Stem Cell-Derived Neural Crest Cells for Tissue Regeneration and Disease Modeling

[3] Rodin et al. Nature Protocol, 2014.Monolaver culturing and cloning of human pluripotent stem cells on laminin-521-based matrices under xeno-free and chemically defined conditions



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