

# PhenoDrive:

## A New Class of Synthetic Biomimetic Extracellular Matrix Analogues.

PhenoDrive is a new class of synthetic biomaterials which enables clinically-reflective and application-driven culture of a range of cell phenotypes.



PhenoDrive substrates facilitates the culture and testing of relevant cell phenotypes in the form of spheroids and/or co-culture models, which closely simulate tissue microenvironments (e.g. stem cell niche, epithelia, cancer mass, hepatocytes spheroids, hypoxic environments). The PhenoDrive biomimetics can be adapted to both 2D and 3D culture conditions and may be applied to most commonly used plasticware including 96- and 24-well plates, T-flasks, transwell's, chamber slides and 3D scaffolds

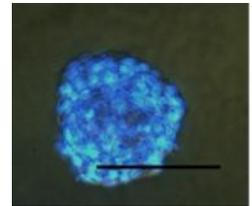
PhenoDrive mimics the mesh-like structure of the tissue extracellular matrix including the Collagen Type IV and many typical bioligands present in the basement membrane (BM) and is composed of hyperbranched molecules presenting among others, laminin-mimicking bioligands (e.g. YIGSR and IKVAV sequences) and cell adhesion bioligands (e.g. RGD). PhenoDrive's hyperbranched structure allows the ordered presentation of these relevant cell-binding molecules at high density and at spacing controlled at the sub-nanometric scale. The mesh like structure of these substrates are also supplied combined with other types of macromolecules including:

- (i) Carboxybetaine a glycocalyx-binding moiety.
- (ii) Phosphoserine a biomineralization template.

(iii) Quinolone an oxygen consuming moiety capable of generating hypoxic micro-environments.

- Culture adult stem cells as spheroids with preserved phenotype in a controlled and reproducible way.
- Chemically defined, animal component free extracellular matrix analogues
- User friendly, supplied as a readily reconstituted dry powder to coat standard tissue culture plastic ware
- Available with a wide range of surface functionalization options
- Compatible with standard microscopic/imaging techniques and regular fixation and staining protocols
- Gamma and UV stable.

PhenoDrive substrates are particularly recommended for the serum free culture of adult stem cells to facilitate their organisation into spheroids with preserved progenitor phenotype in a controlled and reproducible way.



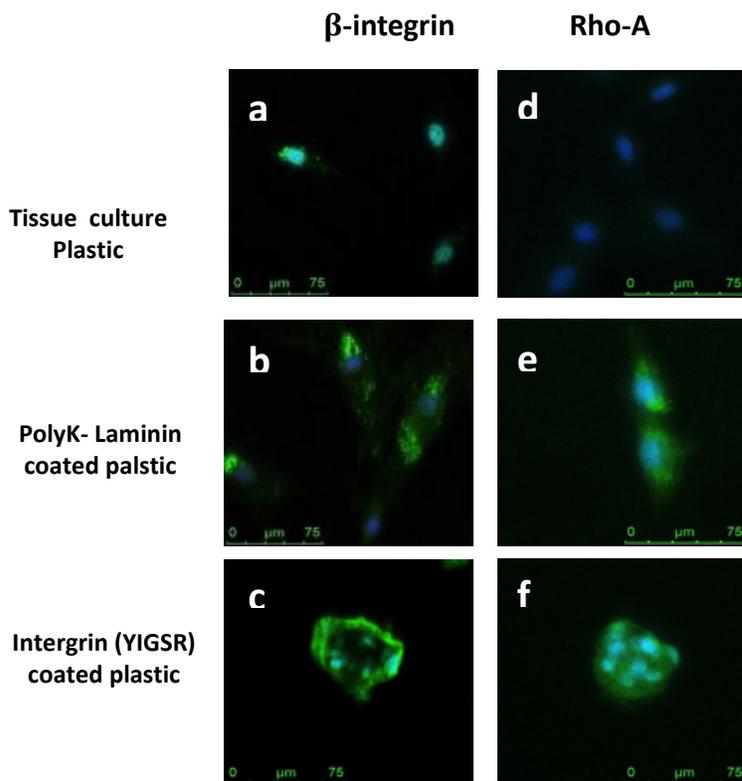
Typical adult stem cell spheroid formed on PhenoDrive. Blue staining shows cell nuclei. Scale Bar =100  $\mu$ m.

PhenoDrive substrates also provide a BM biomimicking role for the culture of other types of cells including endothelial, epithelial, glial and neuronal cells. PhenoDrive formulations are also available to support, fibroblast, hepatocyte and osteoblast cultures and to drive the formation of organoids in co-culture conditions as, for example, those of endothelial cells with adult mesenchymal stem cells or pancreatic beta cells with endothelial cells.

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PhenoDrives are user-friendly, provided as lyophilized powder which is readily reconstituted in ethanol (or aqueous media) to coat tissue culture plastic ware, 3D scaffolds and Transwell polycarbonate membranes by a rapid and simple casting procedure.

PhenoDrive substrates are gamma- and UV stable and do not alter the optical properties of plastic ware or glassware or the physicochemical properties of 3D scaffolds.



Expression of  $\beta$ -integrin and Rho Factor in 3D stem cell spheroids. Green staining shows the expression and localization of the markers, blue staining identifies nuclei. In figure c the localization of the integrin's in the cells at the spheroid periphery is evident. In figure f the HIF-alpha factor is well expressed in the spheroid core indicating cell hypoxic conditions.

Less organised and limited expression is observed in stem cells growing on laminin and non coated tissue culture plastic substrates. Cell nuclei are stained by DAPI.

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PhenoDrive substrates were developed by and are manufactured by Tissue Click Ltd

PhenoDrive, Trade mark applied for.

Tissue Click™ is a registered Trade Mark.

1 x vial is sufficient to coat 1 x 96 well plate.  
(substrate concentration 0.1mg/ml, 50µl per well)

### **Intended use**

Coating of tissue culture plastic ware,  
Glassware and scaffolds