

Supplementary material

Development of an induced pluripotent stem cells-based liver-on-a-chip assessed with an Alzheimer's disease drug.

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SUPPLEMENTARY TABLES

Table S1 Numerical values of the parameters used for the simulations.

Property	Value
Atmospheric pressure (outlet)	0 Pa
Wall conditions	No slip conditions
Density of culture medium (at 37°C)	1000 kg/m ³ ⁴²
Dynamic viscosity of culture medium (at 37°C)	8.1*10 ⁻⁴ Pa*s ⁴²
Diffusion coefficient of oxygen	1.85*10 ⁻¹⁰ cm ² /s
Pump flow rate	30 µl/min

Inlet velocity in the upper chamber	0.001 m/s
Inlet velocity in the lower chamber	$0.19 \cdot 10^{-3}$ m/s
Membrane permeability	$7.8 \cdot 10^{-19}$ m ²
Membrane porosity	$2.5 \cdot 10^{-3}$
Oxygen concentration at the inlets	0.2 mol/m ³
Density of COLL-PEG2000 hydrogel (at 37°C)	1000 kg/m ³
Dynamic viscosity of COLL-PEG2000 hydrogel (at 37°C)	$8.1 \cdot 10^{-4}$ Pa*s
COLL-PEG2000 hydrogel permeability	$6.45 \cdot 10^{-17}$ m ²
COLL-PEG2000 hydrogel porosity	0.93
iPSC-derived hepatocytes oxygen consumption rate	4.5 nmol/(min*10 ⁶ cell) ²⁰
iPSC-derived endothelial cells oxygen consumption rate	1.5 pmol/min/1000 cells ²¹

Table S2 Numerical values of the parameters used for the donepezil distribution simulations.

Property	Value
COLL-PEG2000 hydrogel permeability to donepezil	$6.45 \cdot 10^{-17}$ m ²
Donepezil diffusion coefficient in iEndo culture medium	$4,16 \times 10^{-11}$ m ² /s
Donepezil diffusion coefficient in iHep culture medium	$4,12 \cdot 10^{-11}$ m ² /s
Donepezil diffusion coefficient through the hydrogel	$7,2772 \times 10^{-12}$ m ² /s

Donepezil concentration at the inlet	0.2 mol/m ³
Donepezil partition coefficient	1.07

SUPPLEMENTARY EXPERIMENTAL

Transepithelial electrical resistance assessment

Transepithelial electrical resistance (TEER) was measured using EVOM (World Precision Instruments, USA) coupled with a chopstick-like electrode. Cell layer resistance was calculated placing the shorter electrode in the apical compartment of the Transwell®-like inserts and the longer one in contact with the plate. TEER ($\Omega \cdot \text{cm}^2$) was calculated as follows:

$$TEER = (R_{measured} - R_{blank}) \cdot MembraneArea$$

Where R_{blank} was measured on Transwell®-like inserts without cells and the $MembraneArea$ was 1.13 cm². For each sample, we averaged three measures.

SUPPLEMENTARY FIGURES

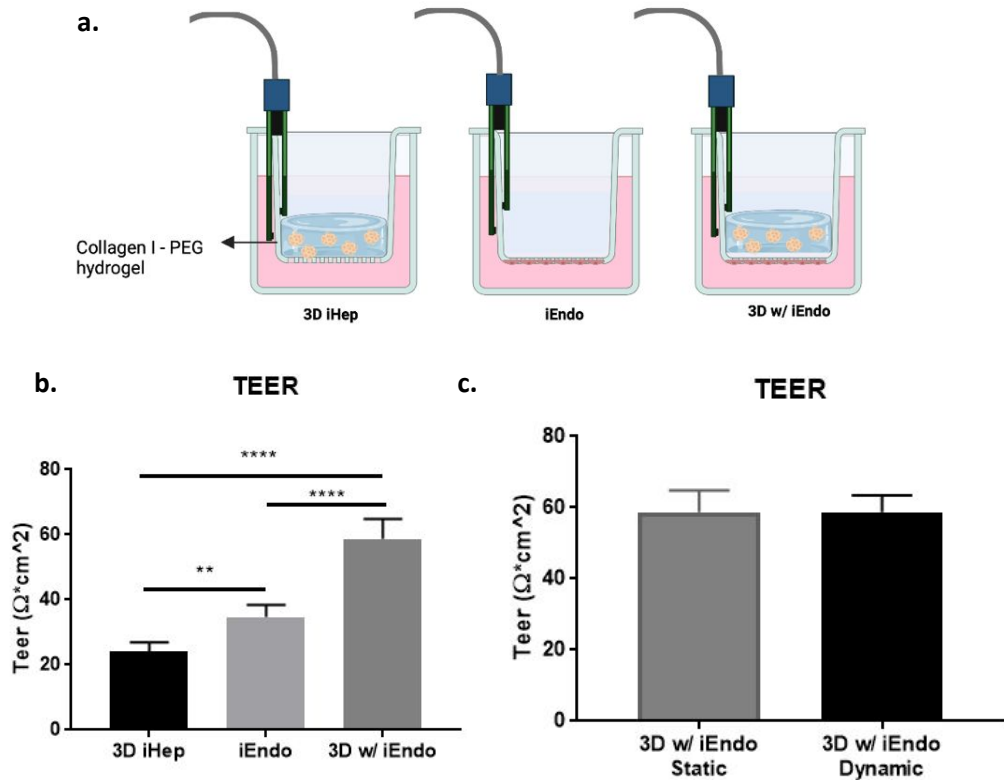


Figure S1. a) The schematic shows the cell models assessed with the TEER test into the Transwell®-like insert. b) For each model we measure TEER in static condition. One-way ANOVA, Tukey's multiple comparison post hoc test **= $p < 0.01$; ****= $p < 0.0001$. c) TEER values of the 3D w/ iEndo model in static and dynamic condition. t-test $p > 0.5$.