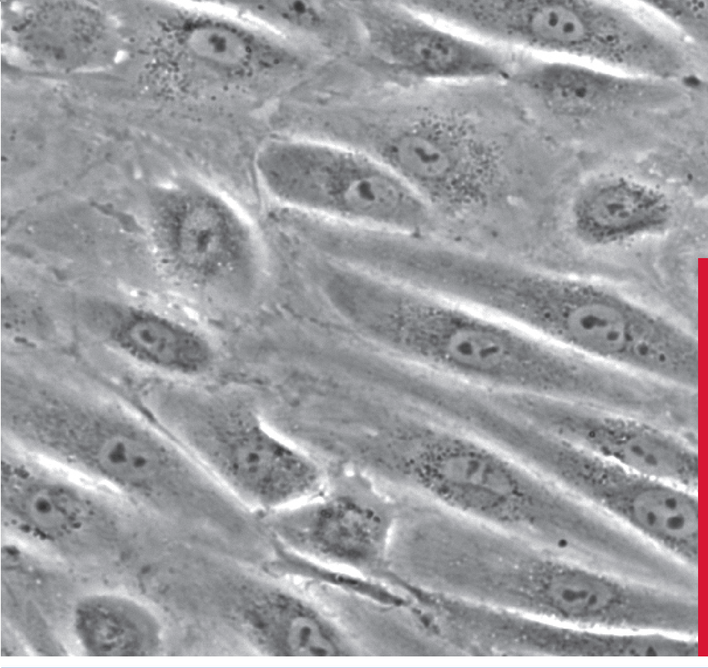
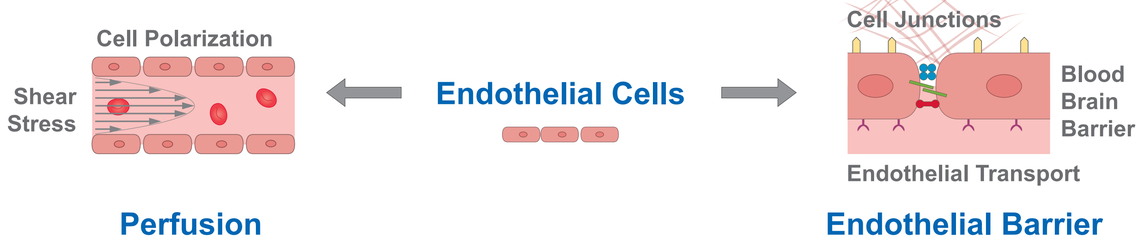


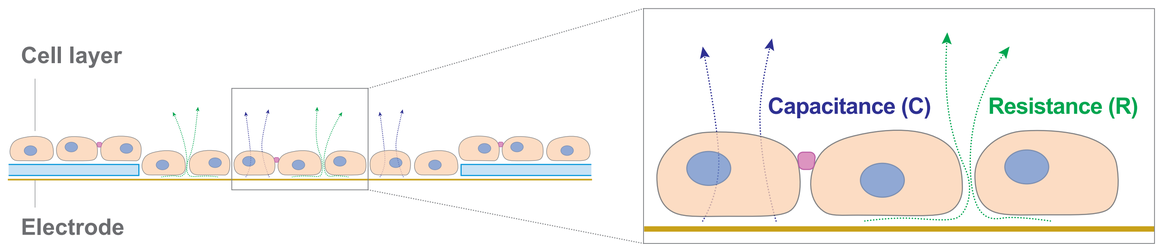
Reveal Physiological Effects in Living Endothelial Cells

Christiane Thanisch, Helga Wagner, Roman Zantl
ibidi GmbH, Am Klopferspitz 19, 82152 Martinsried, Germany

Functions of Endothelial Cells

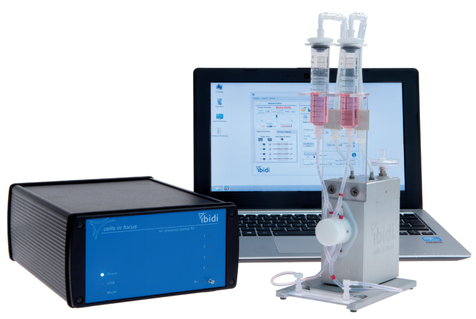


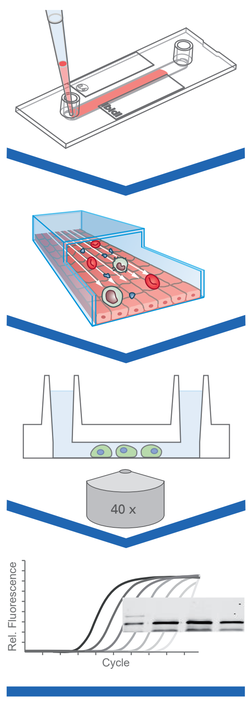
The Principle of Cellular Impedance Measurement



Use the ibidi Pump System for Your Flow Assay

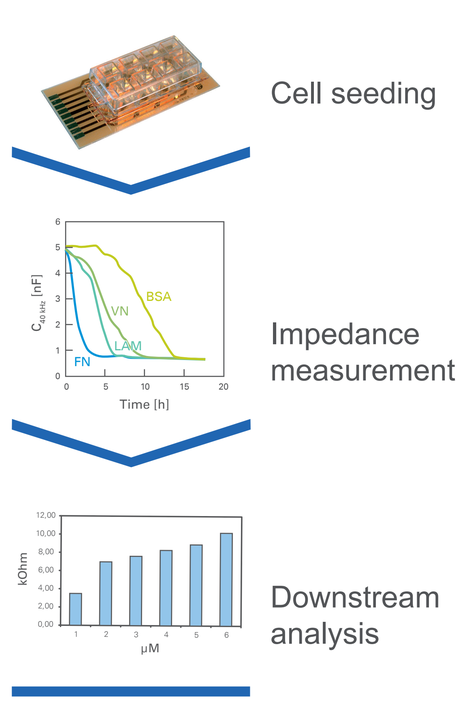
The ibidi Pump System is a perfusion system to cultivate cells under flow with defined levels of shear stress. It allows, e.g., for the simulation of blood vessels, rolling and adhesion assays, and interstitial flow assays.





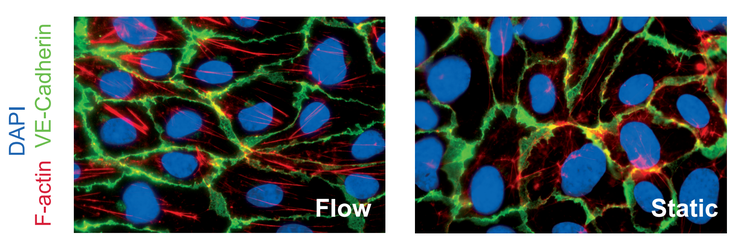
Use the ECIS System for Barrier Function Studies

The ECIS (Electrical Cell-Substrate Impedance Sensing) system is used to study cell-cell (tight junction) and cell-matrix (adhesion and spreading) adherence. Cells are grown on gold-electrodes to measure the transendothelial electrical resistance, which is an indicator for endothelial barrier function.



Analyze Cell Physiology Changes Under Flow

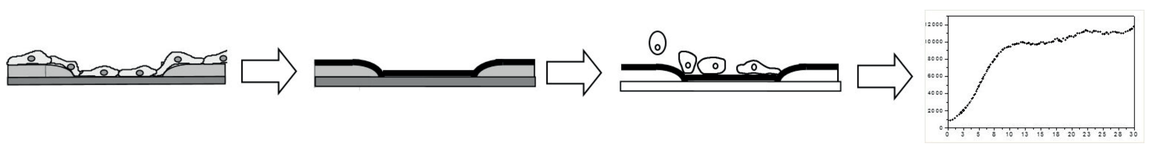
When exposed to laminar shear stress, endothelial cells undergo physiological changes: they elongate uniformly oriented with the flow and show a distinct actin cytoskeleton.



HUVEC under flow at 10 dyn/cm² compared to the static control, cultured in the µ-Slide I 0.4 Luer for 7 days.

Monitor the Impact of ECM on Barrier Formation

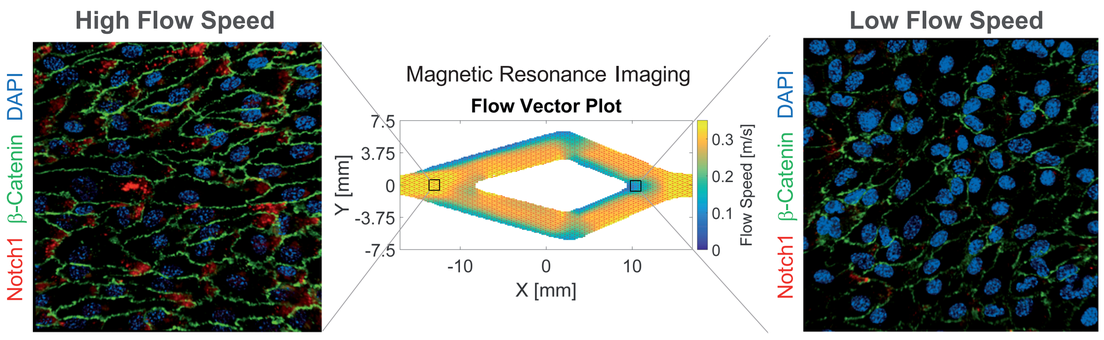
Porcine brain endothelial cells (PBCECs) are seeded on an extracellular matrix (ECM) that is derived from astrocytes, pericytes, endothelial aorta cells, or their own matrix. This results in varying electrical resistances, indicating changes in tight barrier formation.



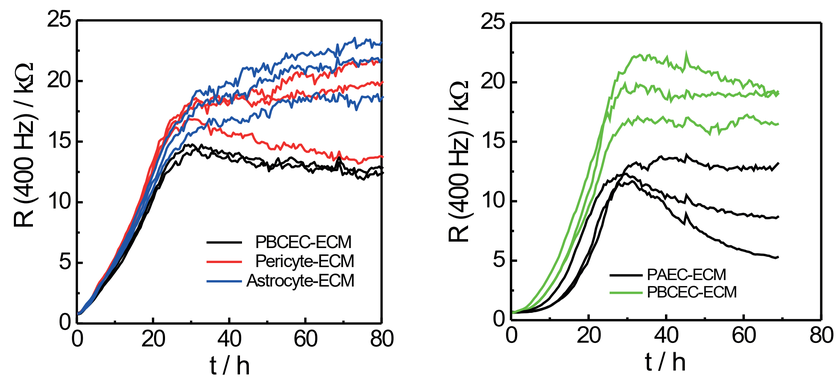
(1) Seeding of first cell layer that provides the ECM. (2) Hydrolysis. (3) Seeding of PBCECs on the ECM basis. (4) Monitoring the impact of ECM on the barrier properties using ECIS.

Mimic Bifurcated Blood Vessels

NOTCH1 is a mechanosensor in adult arteries. Its activation depends on the magnitude of shear stress. Using the µ-Slide y-shaped, the response of human aortic endothelial cells (HAECs) to a gradient of defined shear stress levels can be analyzed.



Images provided by Julia J. Mack, Brian J. Archer, Louis S. Bouchard & Luisa Iruela-Arispe, UCLA.
Mack JJ et al. NOTCH1 is a mechanosensor in adult arteries. Nature Communications (2017). Nov 20;8(1):1620.



PBCECs form a tight monolayer on a brain cell-derived ECM. In contrast, less endothelial barriers are formed when seeded on non-brain aorta-derived ECM.

Images provided by Joachim Wegener, University of Regensburg.
Hartmann C, et al., The impact of glia-derived extracellular matrices on the barrier function of cerebral endothelial cells: An in vitro study, Exp. Cell Res. (2007). Apr 15;313(7):1318-25.