

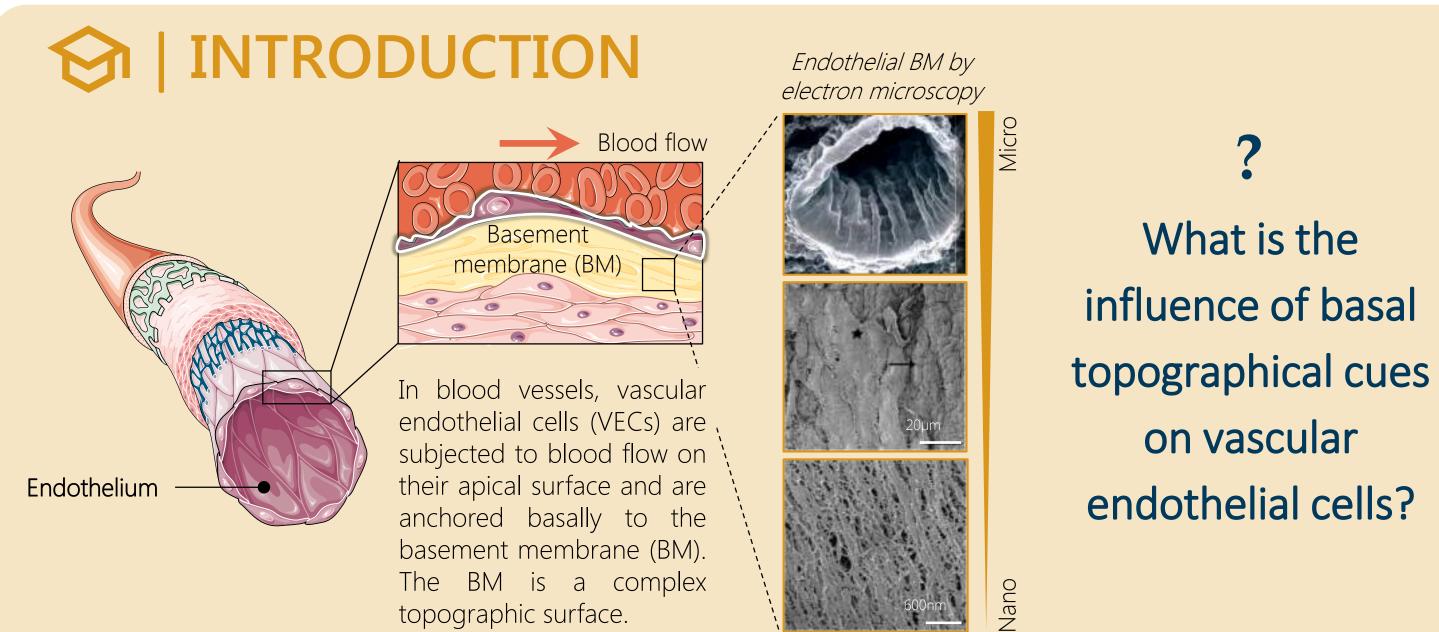
 $_adHyX$

Contact guidance of vascular endothelial cells on microgrooved substrates: influence of groove dimensions and cell density

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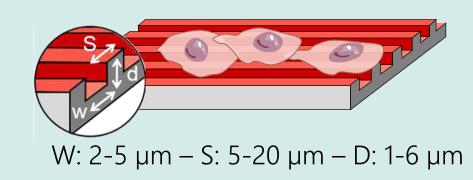


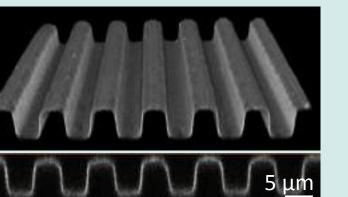
Endothelial cell (ECs) culture on microgrooved substrates

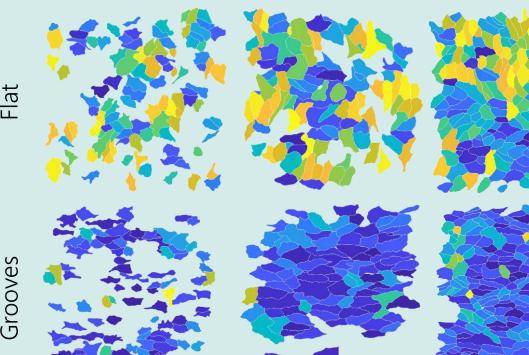
PDMS microgrooved substrates

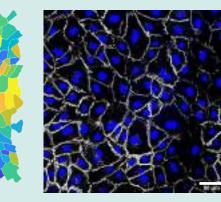
Culture and alignment of HUVECs in the groove direction

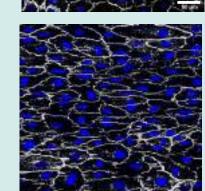
_ 90°











Cell orientation

Nucleus Cell Junctions

Cell orientation

500

500

Cell density $(/mm^2)$

0.

<u>v</u> 0.4

မိ 0.2

Cell density $(/mm^2)$

Cell elongation

1000

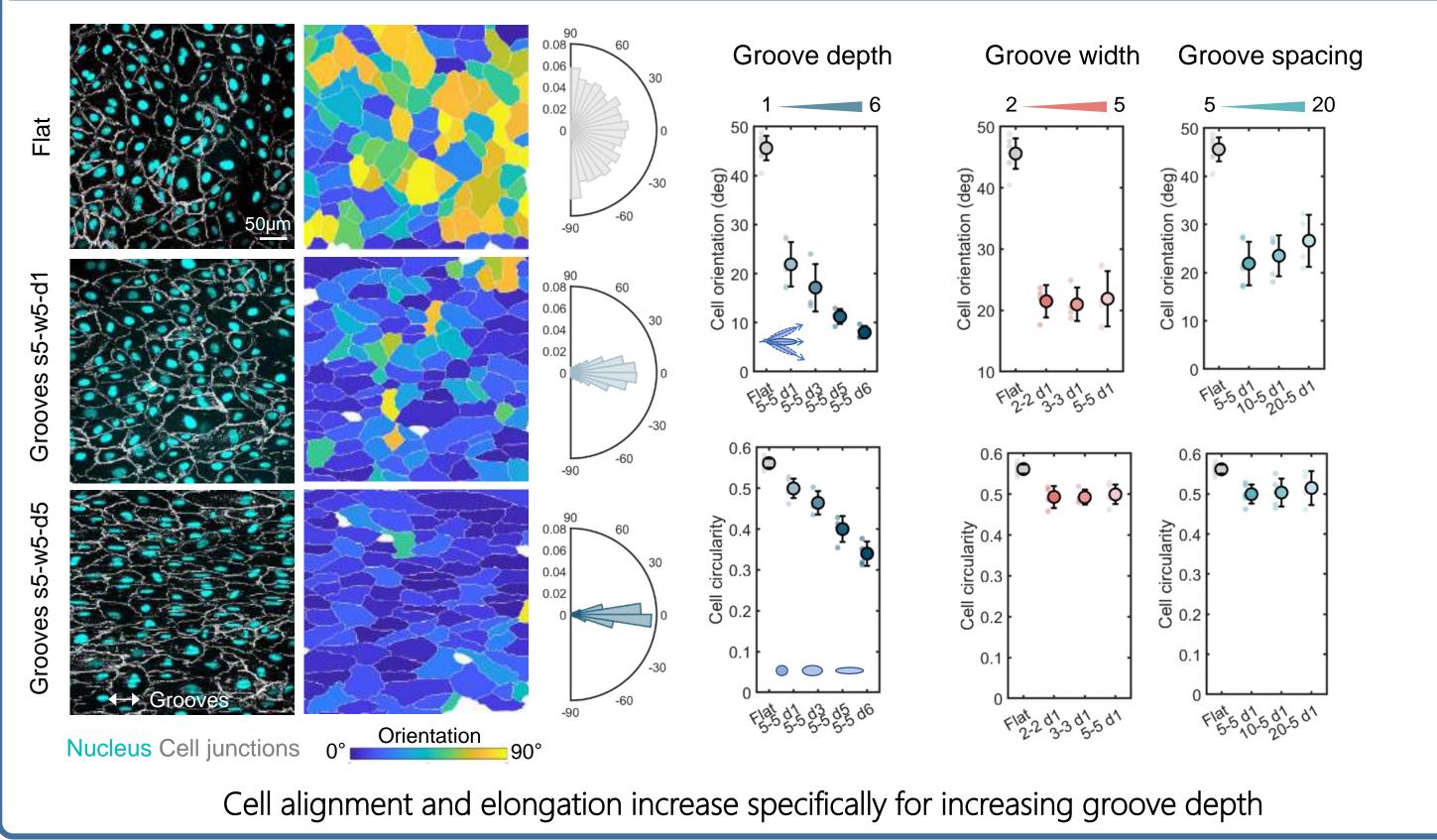
1000

Focal adhesion organization

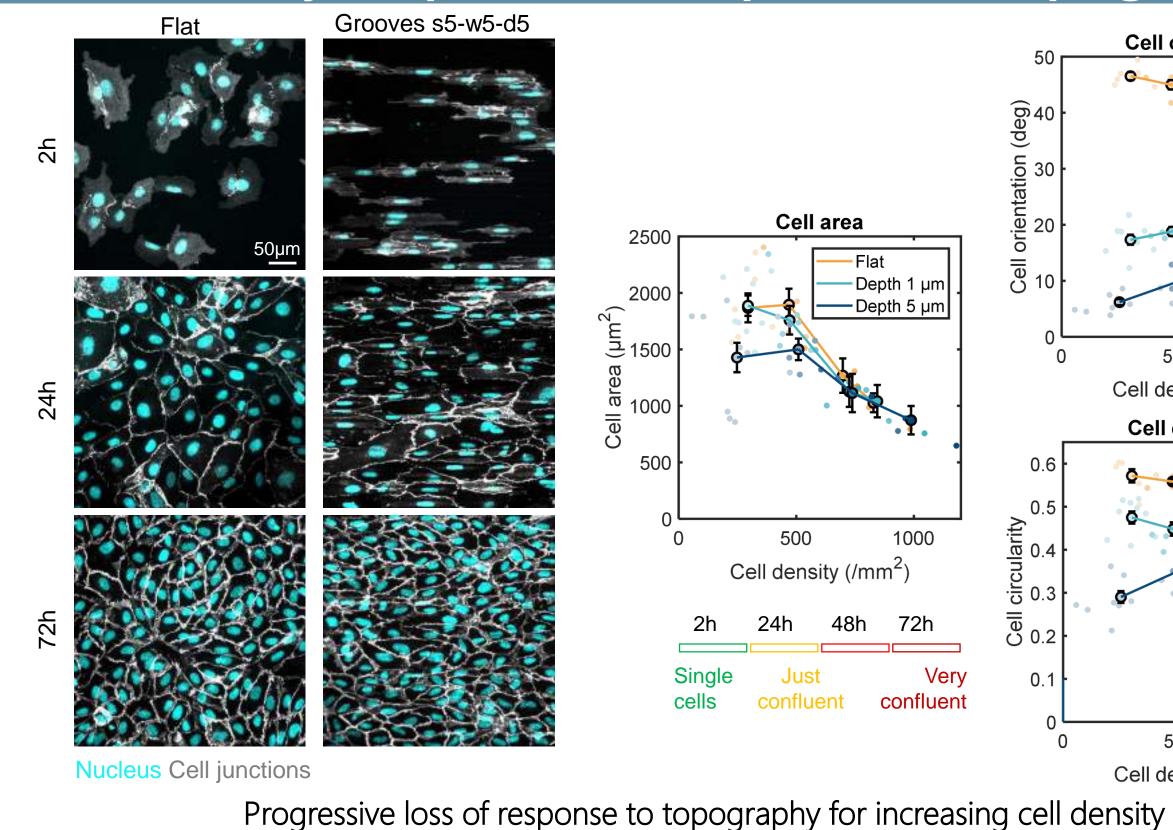
Fibronectin coating

RESULTS

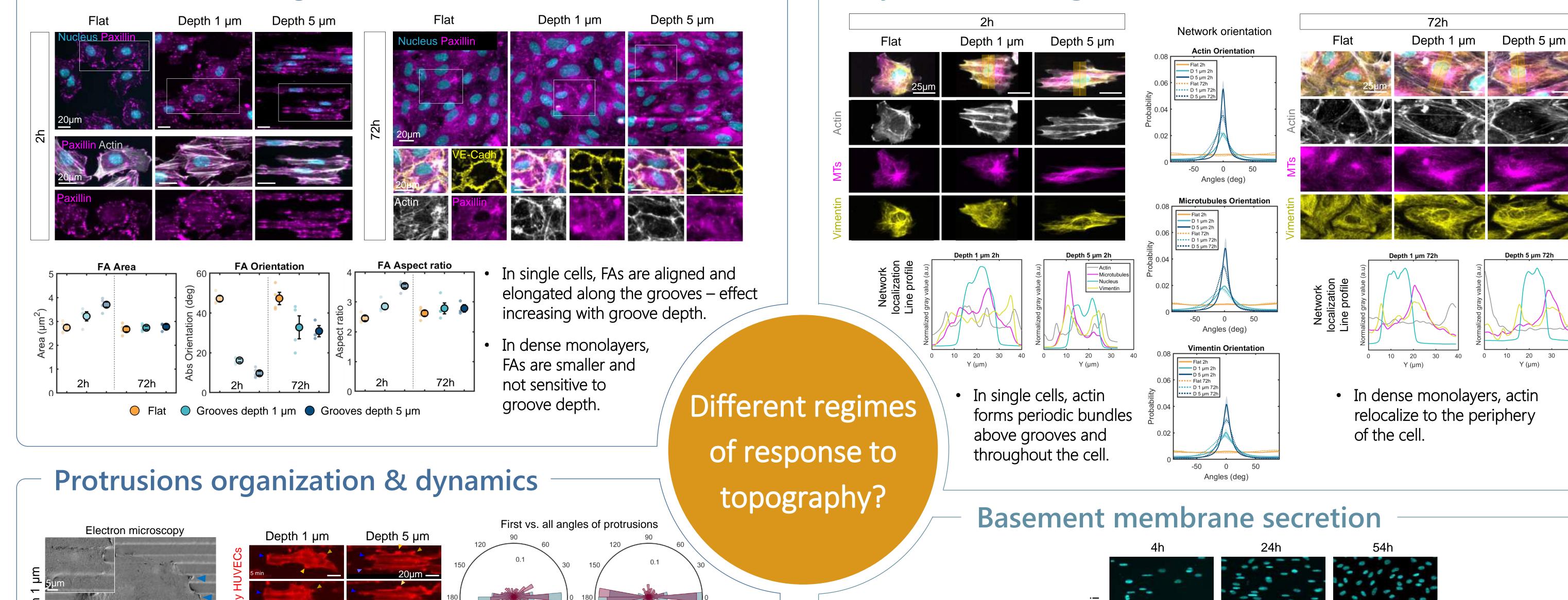
Depth-dependent response to topography

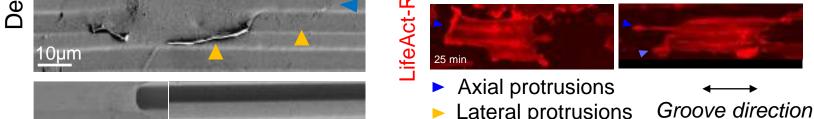


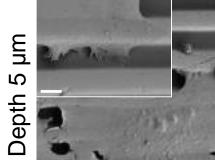
Density-dependent response to topography

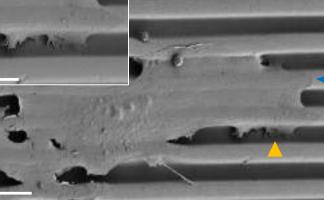


Cytoskeleton organization

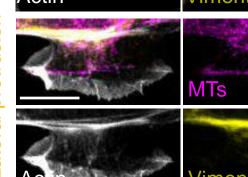


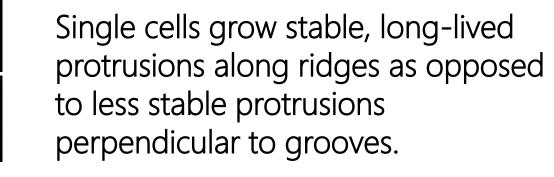












Protrusion displacement

Protrusion lifetime



2 regimes of response to topography

In single cells/subconfluent monolayers

All protrusions

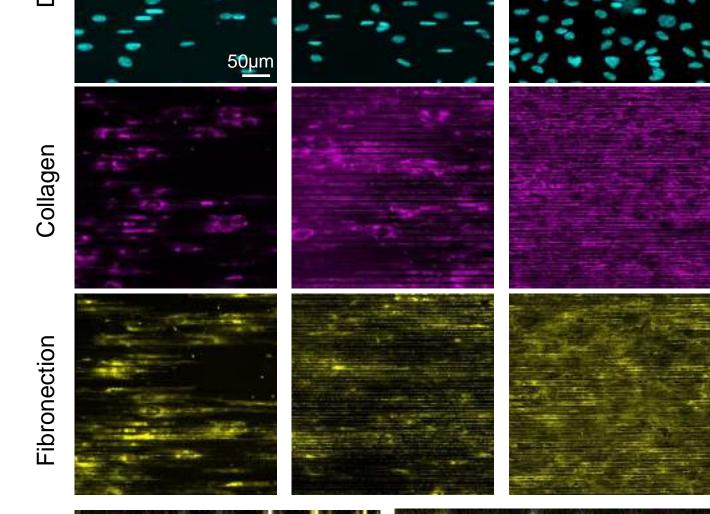
270

Depth 5 µm

Strong, depth-dependent response to grooves, relying on FAs clustering and protrusion guidance

In highly confluent monolayers

Weak interaction with the grooves because of junctions and secreted BM, loss of response to topography





With increasing time and cell density, the amount of secreted BM increases, partially filling the grooves, which can explain the loss of response to topography.

Acknoledgments

Bibliography

C. Leclech, Dessalles CA, Castagnino A, Barakat AI. Integration of substrate- and flow-derived stresses in endothelial cell mechanobiology. Communication biology (2021) C. Leclech, Carlo Natale and Abdul I. Barakat. The Basement Membrane as a Structured Surface: Role in Vascular Health and Disease. Journal of Cell Science (2020)

All protrusions First protrusion

270

Depth 1 µm

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