Electronic Supplementary Material (ESI) for Lab on a Chip.
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Supplementary data

Modelling and breaking down the biophysical barriers to drug delivery in pancreatic cancer

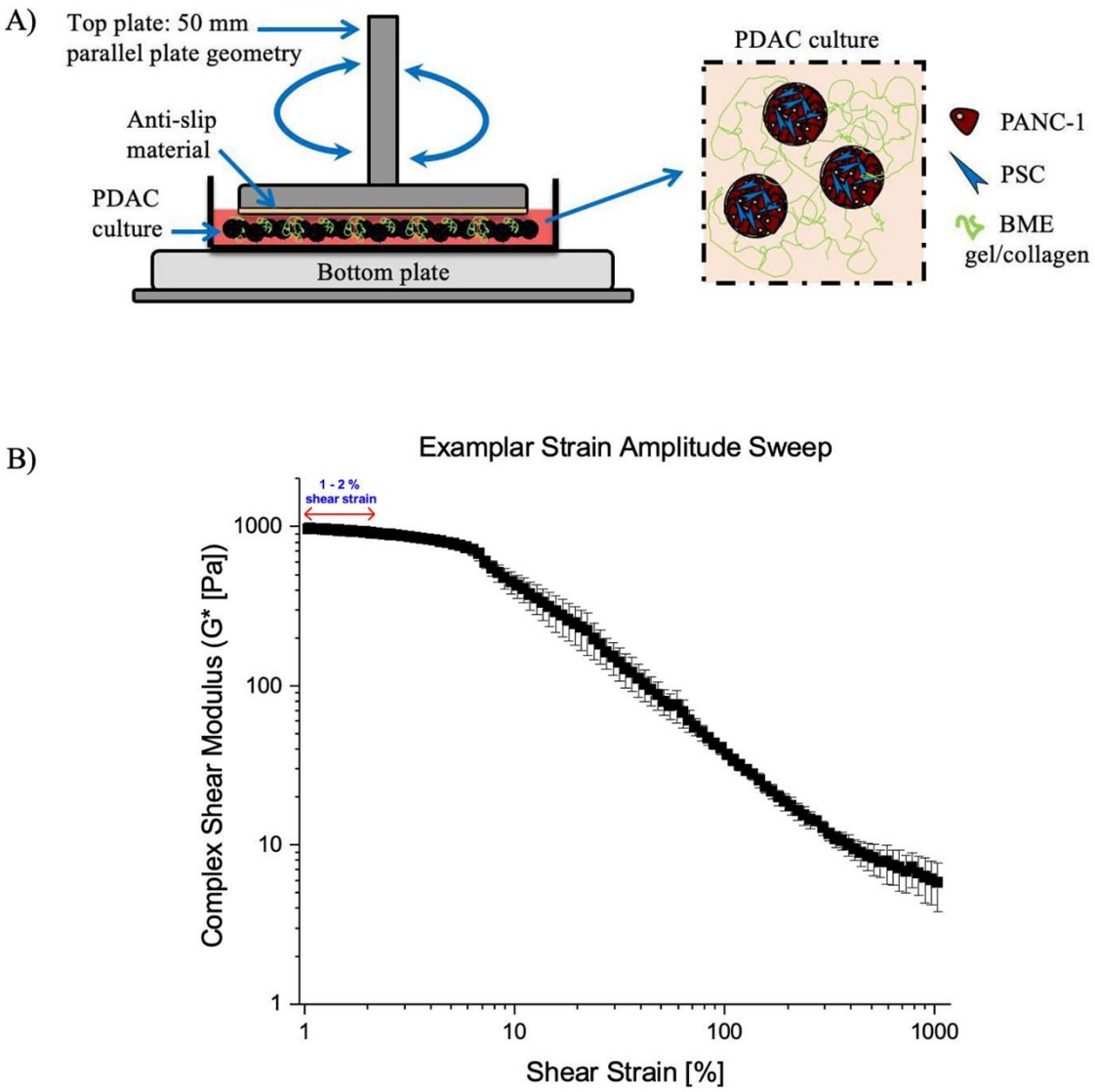
*Delanyo Kpeglo, Malcolm Haddrick, Margaret A. Knowles, Stephen D. Evans, and Sally A. Peyman**

*** Correspondence to Dr S. A. Peyman, S.Peyman@leeds.ac.uk**

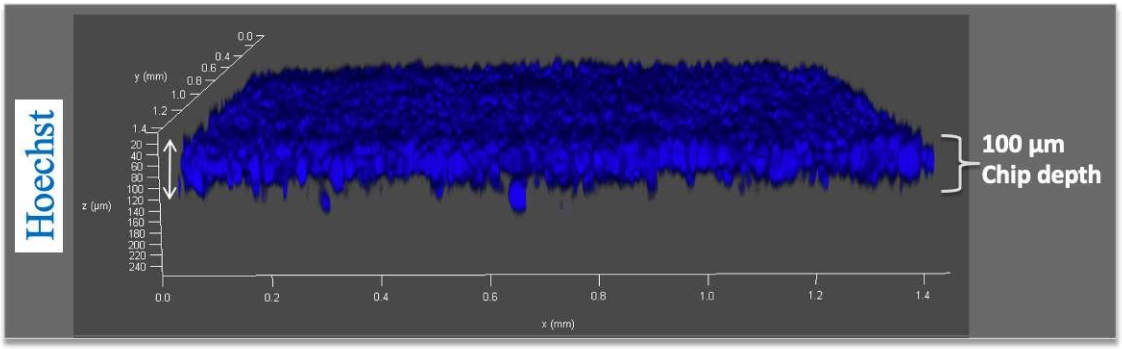
Supplementary Videos

Supplementary video 1. The flow of the fluorescein-media solution through the 21-day microfluidic PDAC model.

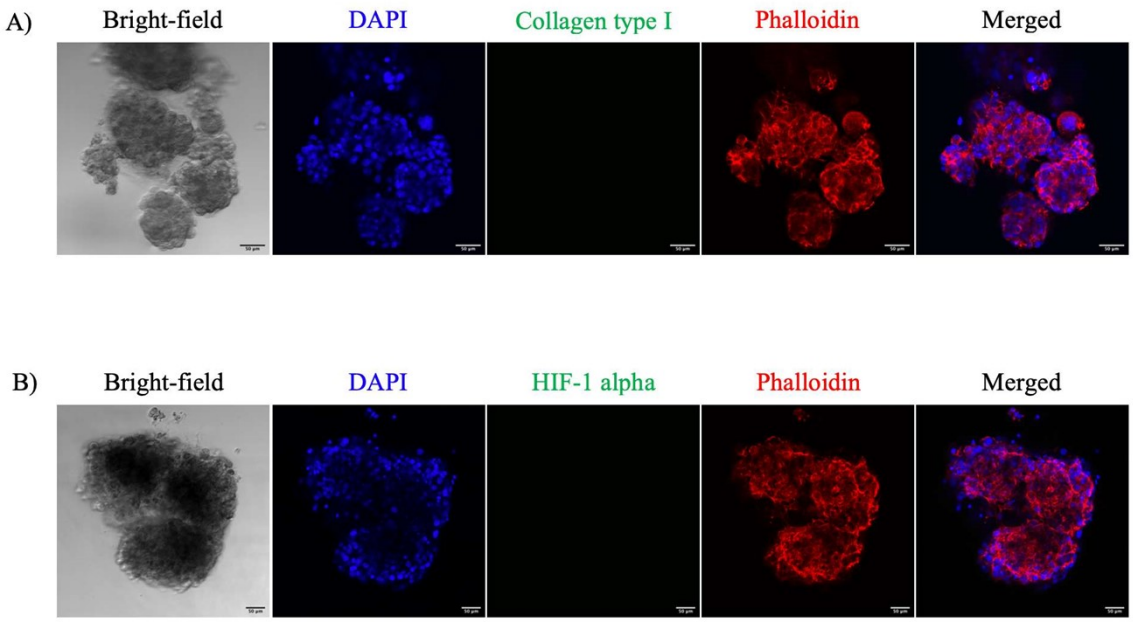
Supplementary video 2. The flow of the fluorescein-media solution through BME gel only.



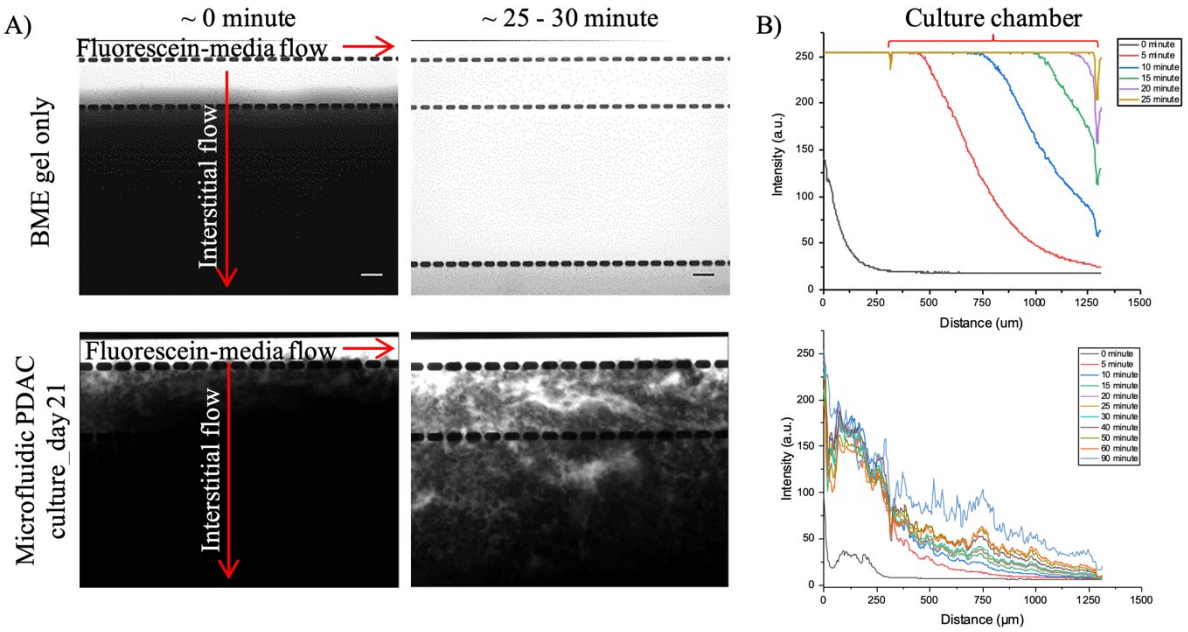
Supplementary Figure 1. A) Schematic representation of the set-up of oscillatory shear rheology of the PDAC cells in BME gel. B) Exemplar strain amplitude sweep measurement of the PDAC cultures in BME gel to determine the amount of deformation needed to be in the linear viscoelastic region for frequency sweep measurements. The complex shear modulus is generated from storage and loss modulus measurements of three replicate cultures of the PDAC cultures. Note, there is an approximately linear viscoelastic region below ≈ 5% strain before significant strain weakening at higher strain values.



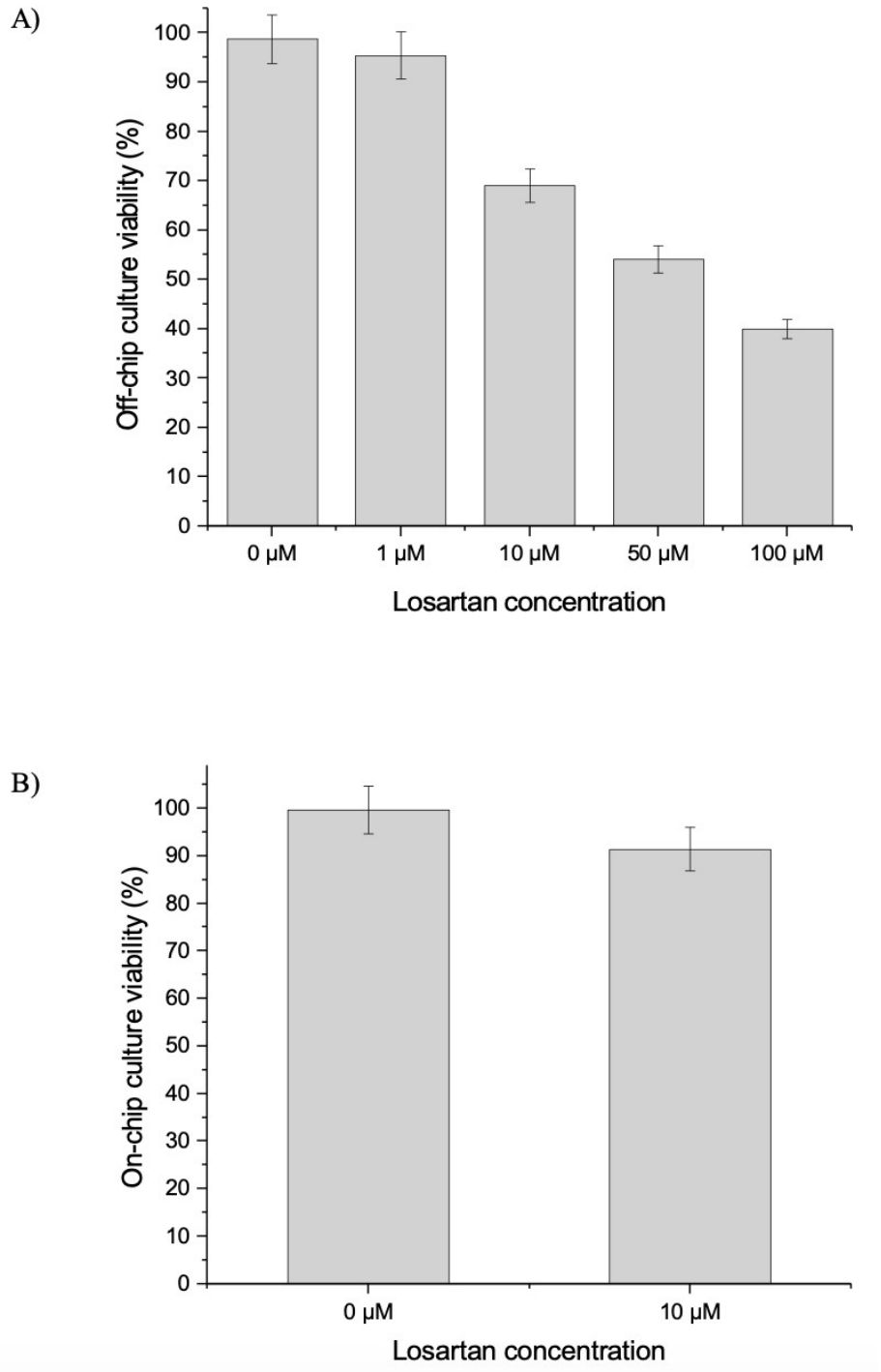
Supplementary Figure 2. Representative confocal z-stack images, with PANC-1 cell-only culture, day 14 of culture, to assess the growth of the PDAC culture model in the entire depth of the culture chamber of the microfluidic device. Hoechst staining showed the cells to be viable in the entire depth of the device. White arrows depict the microfluidic device depth of 100 µm.



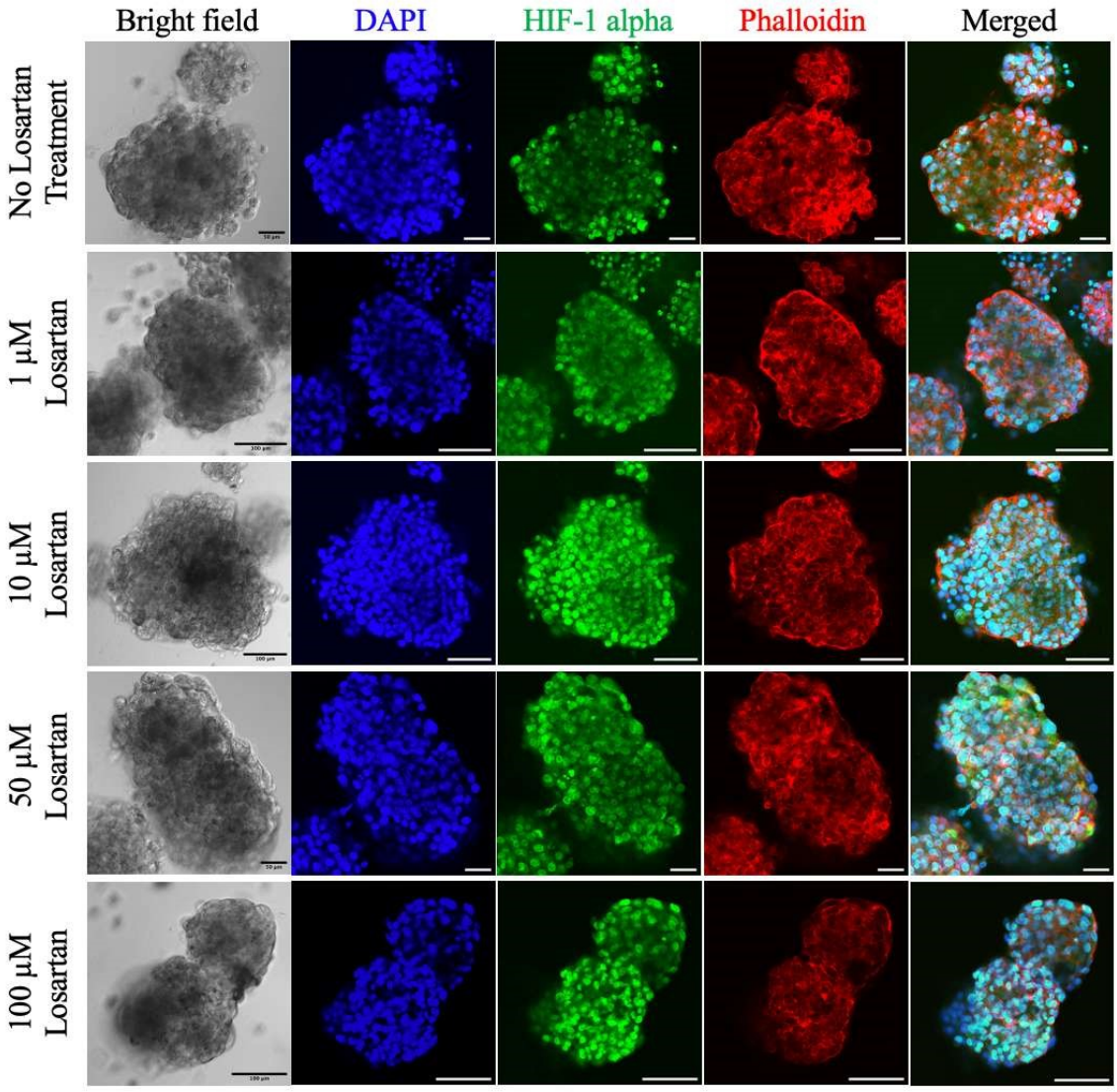
Supplementary Figure 3. Representative confocal images of the negative control of the immunofluorescence stain of the PDAC cultures grown in BME gel, day 14 of culture, for A) collagen type I and B) HIF-alpha, prior to immunostaining the microfluidic PDAC culture model for collagen type I and HIF-1 alpha. Scale bar, 50 µm.



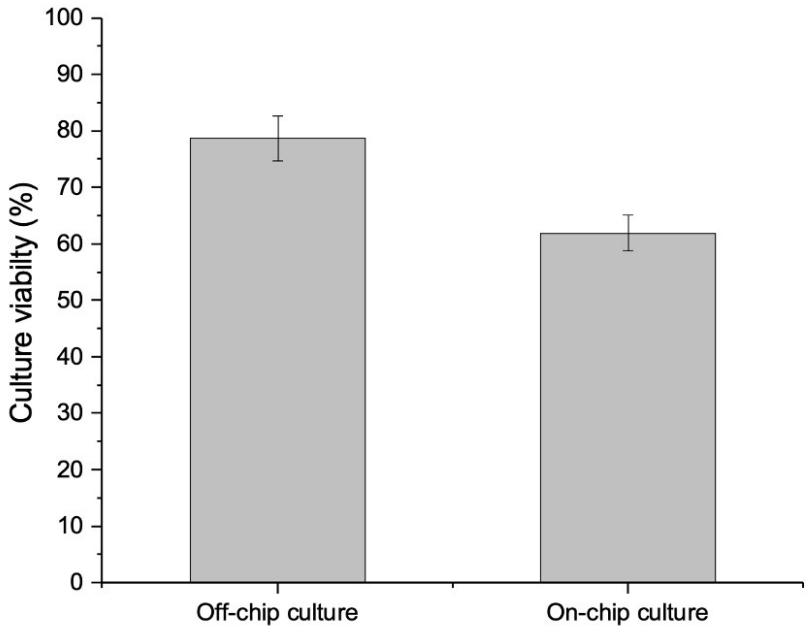
Supplementary Figure 4. The interstitial flow assessment with the perfusion of fluorescein-medium solution. A) Images of the fluorescein-medium solution through BME gel only and the 21-day microfluidic PDAC culture model at 0 and 25 – 30 minutes after perfusion. Scale bar, 200 μm. B) The intensity profile of the perfusion versus the distance travelled in the device with BME gel only and the 21-day microfluidic PDAC culture.



Supplementary Figure 5. ATP viability assessment of A) 21-day off-chip PDAC culture and B) 21-day microfluidic PDAC culture model, following a 72-hour incubation with losartan.



Supplementary Figure 6. Confocal images of the immunostained 21-day off-chip PDAC cultures for HIF-1 alpha following treatment with losartan of different concentrations. Scale bar, 50 and 100 µm.



Supplementary Figure 7. ATP viability assessment of the off-chip and on-chip PDAC cultures, following a 72-hour incubation with 31.25 μM gemcitabine.