

Advancing Drug Testing with a novel human 3D peristaltic Gut-on-Chip platform

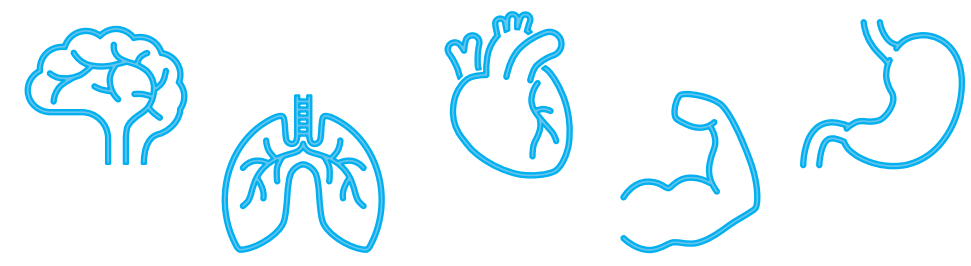
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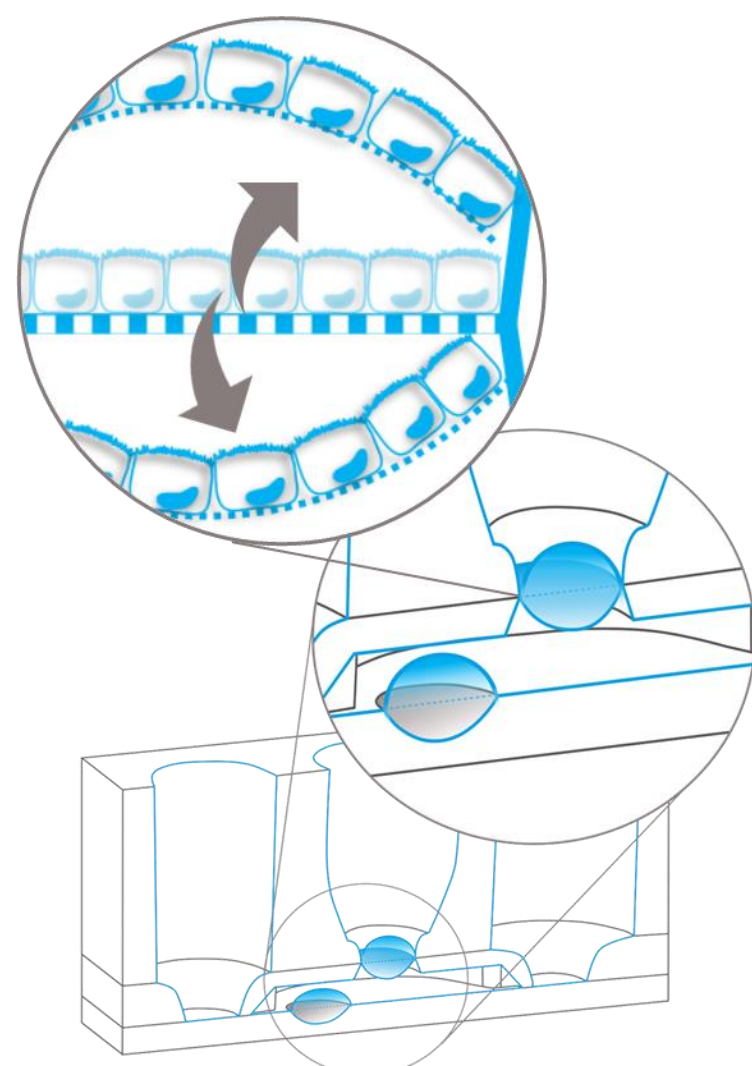


Modelling Organ-specific mechanical cues

The mechanics of the gut play a crucial role in nutrient absorption and the efficacy of orally administered drugs. Achieving an accurate mimicry of physiological conditions and predicting cell responses relies on the faithful replication of biomechanical stimuli.

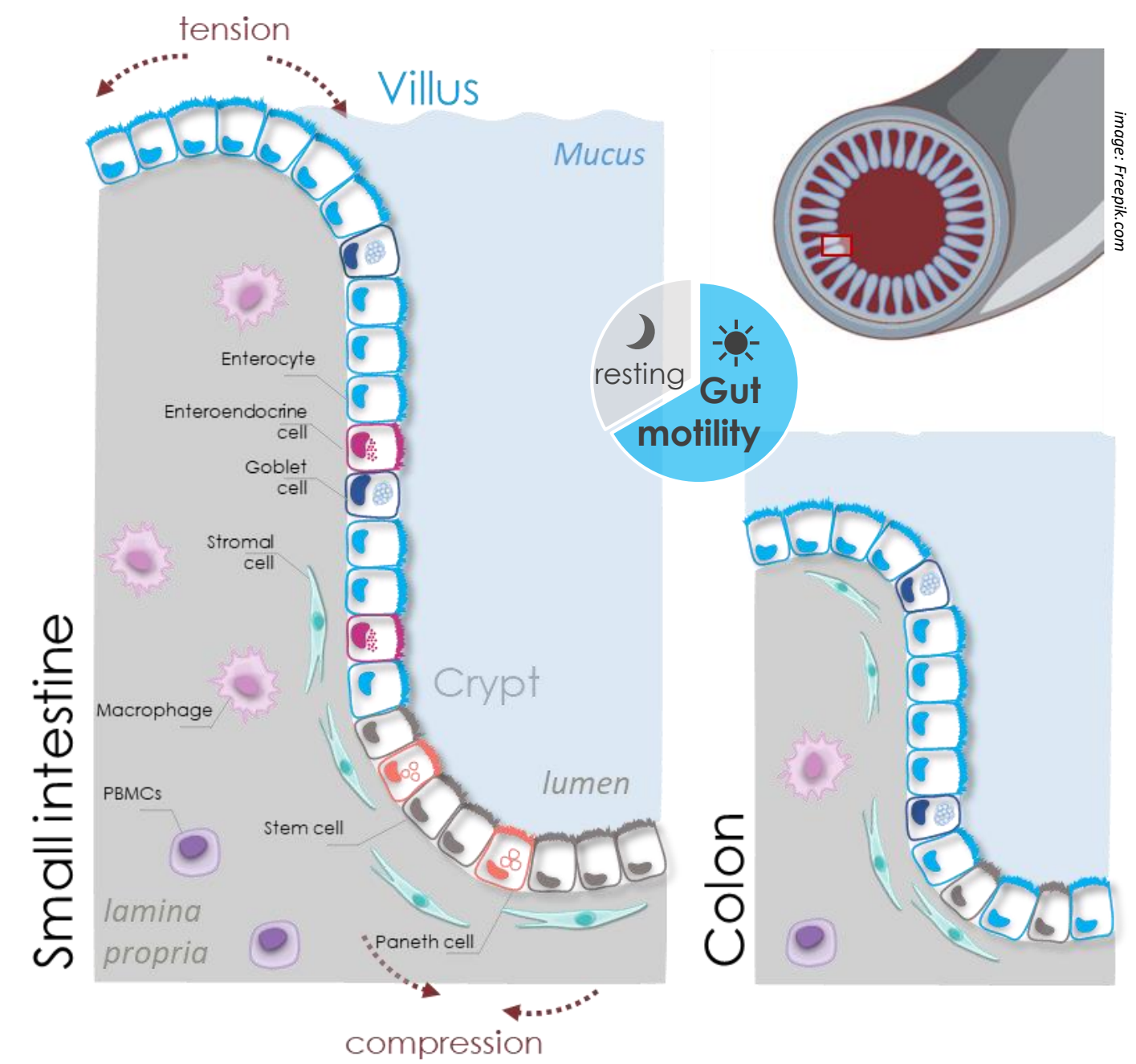


The **AXBarrier-on-Chip** system is a platform enabling to tune strain parameters to reproduce organ-specific mechanical cues (gut, skin, lung, etc.); or strain related (patho)physiological processes. By resting at the ultra-thin, porous, and soft cell culture substrate of the AX12 plate, cells experience near-physiological conditions and preserve specific phenotypes.

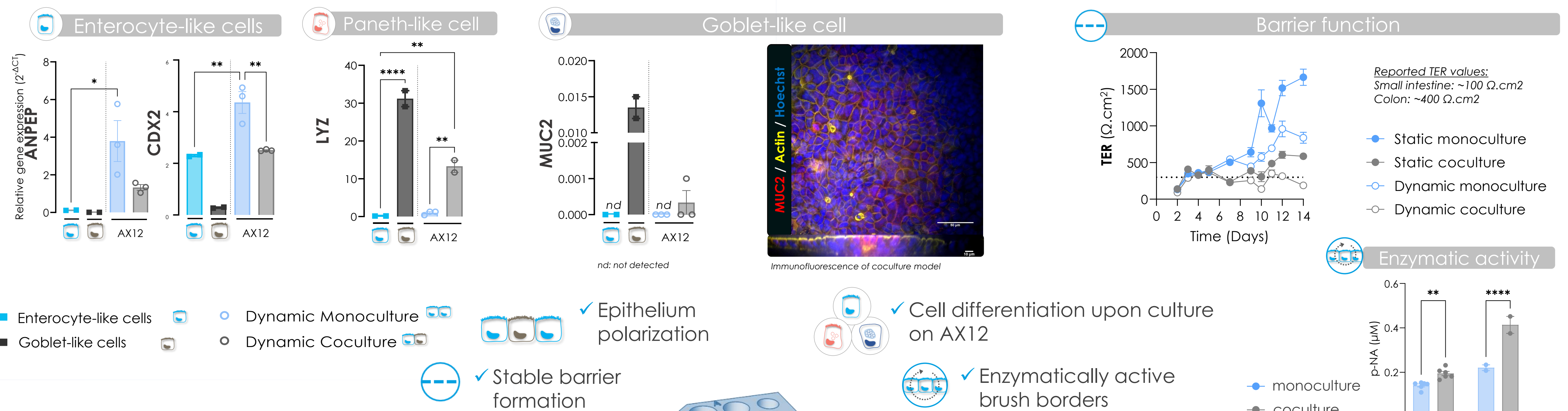


AXBarrier-on-Chip 3D stimulation

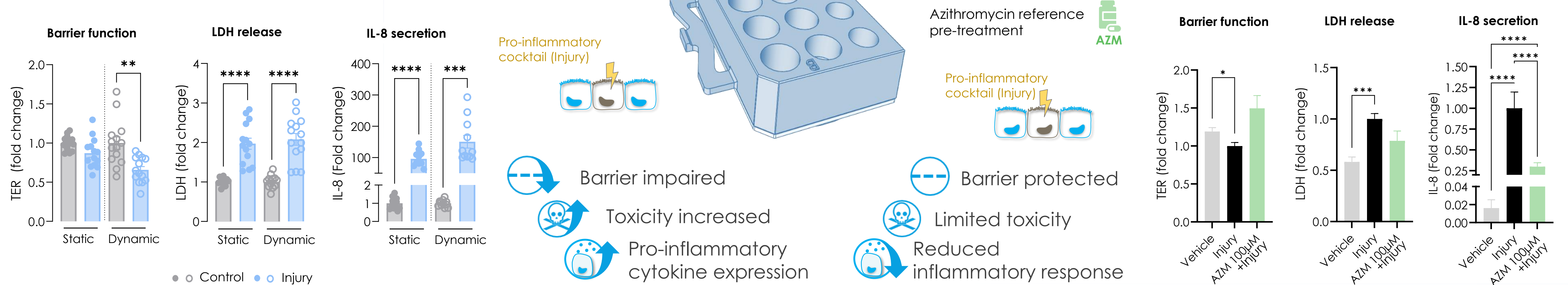
To investigate the applications of this platform, we aimed at replicating the **gut environment** with 3D peristalsis. For that, a co-culture of cell lines representing enterocyte and goblet features was established and exposed to 3D mechanical stimulation following typical day activity patterns (active - day/ resting - night).



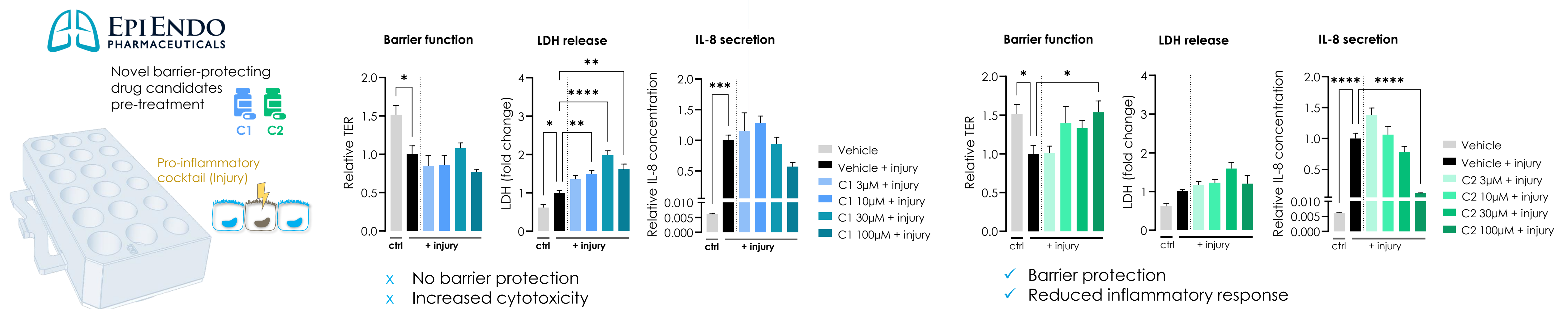
Differentiation of a functional and diversified gut epithelium, enhanced by 3D stimulation



Challenging the model



Drug efficacy application



- ✓ The **AXBarrier-on-chip system** is suitable to accurately model different **tissue barriers** subjected to **dynamic microenvironments**.
- ✓ The inclusion of 3D peristalsis stretch resulted in an **in vivo-like barrier** and an **increased sensitivity** of the developed inflammatory model.
- ✓ This model marks a significant advancement in enhancing the **predictive evaluation** of toxicity, disease modeling, pharmacokinetic studies, and the assessment of drug safety and efficacy.

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All data presented here are shown as Mean ± SEM. Statistics: One-way or two-way ANOVA with Tukey post-test when applicable.

References:
Thompson et al., *Frontiers in Bioengineering and Biotechnology* (2020)
Dinning et al., *World Journal of Gastroenterology*, 16(41) (2010)
Sibillo et al., *Materials Today Bio* 4 (2019)

