BDR SEMINAR (Kobe & online hybrid)

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Wednesday, September 25, 2024

15:00-16:00
1F Auditorium, DB Building C, Kobe / Broadcast online via Zoom
Zoom meeting URL will be announced on the event day by e-mail.
*Non-BDR members: Please register from the following link.
https://krs2.riken.jp/m/bdrseminarregistration (Registration deadline: Sep. 23)

Modular hydrogels for organoid-based disease modelling

Summary

Pathological matrix remodelling plays a central role in many human diseases, but is challenging to study as in vitro models often cannot replicate the complex 3D cell-matrix interactions that drive pathologies. In this seminar, I will discuss how we built a 3D model of the human gut that allowed us to uncover an unexpected role for a rare immune cell type called ILC1 in driving gut fibrosis in patients with inflammatory bowel diseases. We used molecular dynamics simulations to design PEG hydrogels that cross-link quickly, but can still mimic the stiffness of normal intestinal tissue. We then co-cultured encapsulated human intestinal organoids with ILC1, and using a combination of atomic force microscopy force spectroscopy and multiple particle tracking microrheology, found that ILC1 drive intestinal matrix remodelling through a balance of MMP9-mediated matrix degradation and TGF β 1-driven fibronectin deposition. Our findings demonstrate the potential of using hydrogels in disease modelling, and open the possibility of unravelling how pathological matrix remodelling contributes to disease.