5th Multicellular Autonomy seminar

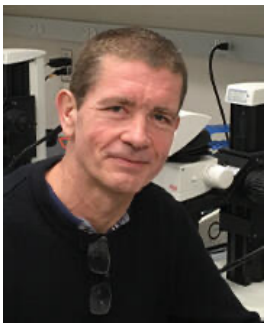
Deconstructing human musculo-skeletal development *in vitro*

July 20th (Thu), 2023 | 4:00PM – 5:00PM (JST)

Hybrid Meeting: Onsite (MAP) & Zoom

Place: 2F Seminar Room, BioSystems Building, Osaka Univ.

会場：大阪大学吹田キャンパス 生命機能研究科 生命システム棟２階 セミナー室



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Skeletal muscles and vertebrae derive from precursors located in the embryonic segments called somites. These structures form periodically from a posterior tissue called Presomitic Mesoderm (PSM). The rhythmic formation of somites involves a molecular oscillator called segmentation clock which drives pulses of Notch, Wnt and FGF signaling in the PSM. Virtually nothing is known on human somitogenesis as it proceeds between 3- and 5-weeks post conception when embryos are extremely difficult to access. We have developed protocols to differentiate human pluripotent stem cells (ES/iPS) *in vitro* into PSM. Single cell RNA-sequencing comparison of these human cells differentiating *in vitro* with mouse embryo PSM reveals that they faithfully recapitulate the PSM differentiation sequence *in vitro*. Using our *in vitro* system as a proxy for human somitogenesis, we were able to demonstrate that human iPS reporter cells harboring a HES7 fluorescent reporter differentiated to PSM exhibit 5-hour oscillations, thus identifying the human segmentation clock. We have also succeeded in generating PSM organoids that can sequentially form somites exhibiting a normal antero-posterior pattern *in vitro*. By mimicking key signaling events leading to muscle formation in the embryo, we developed directed differentiation protocols which recapitulate the developmental sequence of myogenesis. We then used these cells to generate new *in vitro* models of Duchenne Muscular Dystrophy and to pioneer the production of human satellite cells for cell therapy strategies for muscular dystrophies. Our work provides a framework to study early stages of human myogenesis which are poorly accessible in the embryo.

Zoom meeting registration, due date July 19th (Wed)

Application Form: https://forms.gle/WFb8hQVXoFZ3zB717

Host: Tohru Ishitani, Osaka University	Contact us: multicellular.autonomy@gmail.com Inquiry about onsite participation: ishitani@biken.osaka-u.ac.jp

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