IMEG Seminar Series

The road to global science

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Functional attributes of TWIST1 interactome on ectomesenchymal differentiation in craniofacial development

This seminar series is for students, postdoc, and all researchers in Kumamoto University. Check your email box and find the Zoom ID and passcode !!

The basic-helix-loop-helix (bHLH) factor plays pleiotropic roles in craniofacial development. TWIST1 complexes with E-proteins via the helix domain, and with chromatin modifiers via the N-terminal domain. The array of TWIST1 heterodimers and the TWIST1 complexes underpin the diversity of molecular function required for cell type specification during embryogenesis. Functional analyses of the loss and gain of TWIST1:E-protein dimer activity revealed previously unappreciated roles in guiding lineage differentiation of embryonic stem cells. Dimer formation and the balance of dimer types are altered by disease-causing mutations in TWIST1 helix domains, which may explain the defective differentiation of the craniofacial mesenchyme observed in clinical conditions. Complexes of TWIST1 and chromatin remodelling proteins acts as regulators in the neural crest cells for establishing the enhancer repertoire in poising neural differentiation of the bipotential progenitors and maintaining the ectomesenchymal potential following lineage specification. The transcriptional output of TWIST1-chromatin remodeller at different phases of neural crest lineage development underpins the impact of the loss of *Twist1* function in craniofacial malformation.

Relevant references:

1. Fan X et al. (2021) TWIST1 and chromatin regulatory proteins interact to guide neural crest cell differentiation. eLife 2021;10:e62873. DOI: https://doi.org/10.7554/eLife.62873
2. Fan X et al. (2020) TWIST1 homodimer and heterodimers orchestrate lineage-specific differentiation. Mol Cell Biol 40:e00663-19. https://doi.org/10.1128/MCB.00663-19
3. Fan X et al. (2016) Tissue interactions, cell signaling and transcriptional control in the cranial mesoderm during craniofacial development. AIMS Genetics 3(1), 74-98 https://doi.org/10.3934/genet.2016.1.74

You must be fascinated by ...

Micromanipulation and culture of mouse embryos

Dr. Tam pioneered the application of micro-manipulation and embryo culture for analyzing mouse embryos to see the development of head and gut.

A series of fate-maps for body plan

Dr. Tam performed beautiful tissue grafting in mouse embryos to determine the fate-map. Thanks to his works, we now know the cell fate of early mouse embryos.

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