

Seminar

Geometry-driven asymmetric cell divisions pattern cell cycles and zygotic genome activation

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In many species, embryonic development begins with highly synchronous cell divisions that progressively lose synchrony at the midblastula transition. In zebrafish, I showed that cell divisions become spatially patterned into radial mitotic waves, which emerge cell-autonomously through cell-size-dependent regulation of cell-cycle length. The underlying cell-size gradient is generated by embryo geometry, which biases cleavage divisions to produce asymmetric daughter cells. This geometry-driven cell-size gradient also spatially patterns the onset of zygotic genome activation (ZGA). Altering embryo geometry repatterns ZGA onset and reorganises germ-layer fate. Thus, embryo geometry acts as a critical initial condition linking cell division, cell-cycle dynamics, genome activation, and developmental patterning across scales.

Tuesday, Oct 27th 2026

16:00 Hrs (Tea / Coffee 15:45 Hrs)

Auditorium, TIFRH