Imaging the mechano-chemical feedbacks in biological patterning

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ABSTRACT

Cell polarity is necessary for diverse processes during development and prevents progression of cancer and ageing. A hallmark of polarized metazoan cells is the segregation of partitioning-defective (PAR) proteins into distinct compartments at the cell cortex. However, the design principle that governs local interactions among PAR proteins into global cellular patterning remains elusive. Using *Caenorhabditis elegans* zygotes as a model system, my group uncovered 1) the mechanisms underlying symmetry breaking by sperm-donated centrosome[1,2,3,6], and 2) how physical properties of the cell cortex ensures asymmetric segregation of PAR proteins[4]. Based on the core molecular players and interactions in zygotes, we re-constructed the pattern-forming circuits of PAR polarity network in apolar blastomeres[7] and non-metazoan yeast cells[5]. Our findings provide the simplest network that executes self-organizing polarization, which will permit synthetic control of the cell polarity program in living organisms.

REF.

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