O-12.5 Short talk

Robust assessment of asymmetric division in colon cancer cells

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Asymmetric partition of fate determinants during cell division is a hallmark of cell differentiation. Recent works suggested that such a mechanism is hijacked by cancer cells to increase both their phenotypic heterogeneity and plasticity and in turn their fitness. To quantify fluctuations in the partitioning of cellular elements, imaging-based approaches are used, whose accuracy is limited by the difficulty of detecting cell divisions. Our work addresses this gap proposing a general method based on high-throughput flow cytometry measurements coupled with a theoretical framework. We applied our method to a panel of both normal and cancerous human colon cells, showing that different kinds of colon adenocarcinoma cells display very distinct extents of fluctuations in their cytoplasm partition, explained by an asymmetric division of their size. To test the accuracy of our population-level protocol, we directly measure the inherited fractions of cellular elements from extensive time-lapses of live-cell laser scanning microscopy, finding excellent agreement across the cell types. Ultimately, our flow cytometry-based method promises to be accurate and easily applicable to a wide range of biological systems where the quantification of partition fluctuations would help accounting for the observed phenotypic heterogeneity and plasticity.