

BDR SEMINAR in Osaka

"CDB SEMINAR" and "QBiC SEMINAR" have been renamed "BDR SEMINAR".

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Thursday, September 27, 2018 14:00-15:00

3F Seminar Room, Quantitative Biology Bldg. A, Osaka

Trigger waves in cell signaling

Summary

Xenopus laevis eggs are huge cells, so that even a freely diffusing protein would take hours to make it from the center of the egg to the cortex. Despite this, mitosis takes place quickly and in a spatially coordinated fashion in fertilized *Xenopus* eggs. Because there is positive feedback in the circuit that regulates Cdk1, the egg has the possibility of supporting trigger waves of Cdk1 activation that spread over large distances faster than diffusion alone would allow. We carried out experiments to look for these trigger waves, using cell free *Xenopus* egg extracts in thin Teflon tubes and a fluorescence microscopy assay for mitosis. We found that Cdk1 activation does, as hypothesized, spread linearly through these extracts at a constant speed of $\sim 1 \mu\text{m}/\text{sec}$, allowing Cdk1 activity to spread from the center to the cortex of an egg in about 10 min. Likewise, apoptosis spreads through eggs and egg extracts via trigger waves of caspase activity. The proteins involved are different, and the speed is a bit slower ($\sim 0.5 \mu\text{m}/\text{sec}$), but the basic logic of the process is the same as that of mitotic trigger waves. We suspect that trigger waves may be found in other signaling systems where decisive processes need to be coordinated over long distances.



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