

## What Determines Mitotic Spindle Length?

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The early mitotic divisions in the *C. elegans* embryo are extremely predictable making it an ideal organism in which to study mitotic spindle assembly. As an embryo develops from a fertilised egg to a multi-cellular stage, bipolar mitotic spindles get progressively smaller. But how is length regulated through development? Based on experimental observations we have generated a theoretical argument on how various parameters contribute to spindle length. We set out to test the validity of this argument using both experimental and computational approaches. Using embryos that expressed GFP fusion proteins we were able to follow many mitotic events using light microscopy. Matlab was then used to track and quantify cell size, spindle length, centrosome size, and kinetochore size. We were able to show that there is a strong correlation between spindle length and centrosome size; as spindles get shorter during development, centrosome size also decreases. Both the size of the metaphase plate and the amount of kinetochores on it, also decrease as spindle length decreases. It was possible to measure how the many parameters of a mitotic spindle correlate, and we were then able to fit these back into the model. Thus we argue that we have a valuable model on how mitotic spindle length is set in a *C. elegans* embryo that may be applicable to other systems.