Supplementary Information

Fig. S1 Laser ablation of the cell cortex causes the local relaxation of the cortical tension/contractility

(A, B) Two examples of the response of the cortical actomyosin network to laser ablation, monitored by imaging myosin II-GFP. The anterior tip (green arrow, the left panel) was ablated by the illumination with a UV laser. The kymograph of the myosin II distribution along the yellow line is presented on the right. The cortical relaxation was detected immediately after the laser ablation (indicated with white lines) and was followed by hyper-accumulation of myosin II (10~20 s after the ablation), presumably as a process of wound healing.

Fig. S2 Measurement of the density of microtubules near the cell cortex

Related to figure 4B. (A-D) The density of the microtubules at a cortical point was determined by line-profiling of tubulin-YFP and by subtracting the local background level. (E) The average across 9 embryos as shown in **Fig. 4B**. See Materials and Methods for more details.

Fig. S3 Scoring the activity of cytoplasmic transport of myosin II

The activity of the centrosome-directed cytoplasmic transport of myosin II was scored by analyzing the trajectories of the myosin II particles, which need correction for the movement of the whole aster towards the cortex. Only the movement away from the cell cortex was considered. All the particles detected were consolidated across the embryos and the cumulative sums are presented in the main figures.

Fig. S4 Measurement of the density and flow of the cortical myosin II

A schematic illustration of the procedure of measuring the density and the flow of the cortical myosin II.

Fig. S5 Synthetic effect of the CYK-4 GAP mutation and depletion of LIN-5/NuMA or GPR-1/2/Pins/LGN

(A) Stills from the live imaging of embryos of the indicated genotypes by differential interference contrast microscopy. While the *cyk-4(or749)* embryos, which failed cytokinesis due to late regression of the cleavage furrow, could form a furrow that deepened beyond 50% (cyan arrowheads in (A)), the additional depletion of LIN-5 or GPR-1/2 severely prevented this (B), allowing only very shallow furrowing (pink arrows in (A)).

Video 1

NMY-2::GFP in the midplane of a *C. elegans* one-cell stage embryo during metaphase. The cytoplasmic particles of myosin II only showed random motion.

Video 2

NMY-2::GFP in the midplane of a *C. elegans* one-cell stage embryo from prometaphase to anaphase. The cytoplasmic particles of myosin II, which showed random motion from prophase to metaphase, gradually disappeared towards the transition to anaphase. After anaphase onset, unidirectional movement of myosin II particles from the cell cortex to the spindle poles was observed.

Video 3

NMY-2::GFP in the midplane of a *C. elegans* one-cell stage embryo during anaphase. The cytoplasmic particles of myosin II showed unidirectional movement towards the spindle poles.

Video 4

NMY-2::GFP in the midplane of a one-cell stage *dhc-1(RNAi)* embryo in anaphase. The spindle pole-directed unidirectional motion of the myosin II particles was abolished.

Video 5

NMY-2::GFP in the midplane of a one-cell stage *lin-5(RNAi)* embryo in anaphase. The spindle pole-directed unidirectional motion of the myosin II particles was abolished.

Video 6

NMY-2::tagRFP-T and PH::GFP in the midplane of a *C. elegans* one-cell stage embryo during anaphase. Invagination of the plasma membrane with or without a myosin II particle at the leading tip (Fig. 3A).

Video 7

NMY-2::tagRFP-T and PH::GFP in the midplane of a *C. elegans* one-cell stage embryo during anaphase. Heterogeneity in the colocalization between myosin II and the membrane marker on the cytoplasmic particles (Fig. 3B).

Video 8

NMY-2::tagRFP-T and tubulin::YFP in the midplane of a *C. elegans* one-cell stage embryo during anaphase (an example of the movies used for Figs. 3 and 4).

Video 9

NMY-2::tagRFP-T and tubulin::YFP in the midplane of a *C. elegans* one-cell stage embryo during anaphase. A myosin II particle was internalized from the posterior cortex and moved along a microtubule fiber towards the posterior spindle pole (Fig. 3C). The sequence is repeated three times.

Video 10

NMY-2::tagRFP-T and tubulin::YFP in the midplane of a *C. elegans* one-cell stage embryo during anaphase. A myosin II particle was internalized from the anterior cortex and moved along a microtubule fiber towards the anterior spindle pole (Fig. 3E). The sequence is repeated three times.

Supplementary Table 1

List of *C. elegans* strains used in this study.