

## **Supplementary movies**

**Supplementary movie 1. Efficient chromosome congression in a control HEK293T cell.** Images for H2B-GFP were recorded at 10-second intervals for 2,660 seconds. Representative frames are shown in Figure 2C.

**Supplementary movie 2. Mitotic progression in ZW10-depleted HEK293T cells.** Images for H2B-GFP were recorded at 1.5-minute intervals for 262.5 minutes. Representative frames are shown in Figure 2B.

**Supplementary movie 3. Behaviors of unaligned chromosomes in a ZW10-depleted HEK293T cell.** Images for H2B-GFP were recorded at 10-second intervals for 1,210 seconds. Representative frames are shown in Figure 2D.

**Supplementary movie 4. Mitotic progression and spindle dynamics in a ZW10-depleted HeLa cell.** Images for GFP- $\alpha$ -tubulin (left half) and H2B-RFP (right half) were recorded at 3-minute intervals for 210 minutes. Representative frames are shown in Figure 3B.

**Supplementary movie 5. Behaviors of unaligned chromosomes in a Nudel-depleted HEK293T cell.** Images for H2B-GFP were recorded at 10-second intervals for 1,190 seconds. Representative frames are shown in Figure 4D.

**Supplementary movie 6. Chromosome behaviors on the monoaster in a control HEK293T cell.** Images for H2B-GFP were recorded at 10-second intervals for 1,200 seconds. Representative frames in the first 180 seconds are shown in Figure 6A.

**Supplementary movie 7. Chromosome behaviors on the monoaster in a ZW10-depleted HEK293T cell.** Images for H2B-GFP were recorded at 10-second intervals for 1,200 seconds. Representative frames in the first 180 seconds are shown in Figure 6C.