

Movie S1.

Confocal sections of a human meiosis I (MI) spindle fixed at 15 hours after nuclear envelope breakdown (NEBD), stained for NUMA (green), microtubules (magenta, α -tubulin) and chromosomes (gray, Hoechst).

Movie S2.

Confocal sections of a cold-treated mouse MI spindle fixed at 7.25 hours after release, stained for NUMA (green), microtubules (magenta, α -tubulin) and aMTOCs (red, PCNT).

Movie S3.

Confocal sections of an acutely NDC80-depleted mouse MI spindle fixed at 7.5 hours after release, stained for NUMA (green), microtubules (magenta, α -tubulin) and aMTOCs (red, PCNT).

Movie S4.

Confocal sections of a cold-treated aMTOC-free mouse MI spindle fixed at 7.25 hours after release, stained for NUMA (green) and microtubules (magenta, α -tubulin).

Movie S5.

Confocal sections of an acutely NDC80-depleted aMTOC-free mouse MI spindle fixed at 7.5 hours after release, stained for NUMA (green) and microtubules (magenta, α -tubulin).

Movie S6.

FIB-SEM sections of the MI spindle from an mClover3-NUMA-expressing aMTOC-free mouse oocyte microinjected with gold-conjugated GFP nanobody shortly before fixation at 7 hours after release.

Movie S7.

Time-lapse movie of meiotic maturation of mouse oocytes microinjected with mClover3-NUMA (green), mScarlet-MAP4-MTBD (magenta, to label microtubules), H2B-miRFP (blue, to label chromosomes), mTRIM21, control IgG or anti-PCNT.

Movie S8.

Time-lapse movie of meiotic maturation of aMTOC-free mouse oocytes microinjected with mClover3-MAP4-MTBD (green, to label microtubules), H2B-miRFP (magenta, to label chromosomes), mTRIM21, control IgG or anti-NUMA.

Movie S9.

Time-lapse movie of meiotic maturation of aMTOC-free mouse oocytes expressing mClover3-MAP4-MTBD (green, to label microtubules), H2B-miRFP (magenta, to label chromosomes), MBP or P150-CC1.

Movie S10.

Time-lapse movie of meiotic maturation of aMTOC-free mouse oocytes expressing mClover3-MAP4-MTBD (green, to label microtubules), H2B-miRFP (magenta, to label chromosomes), MBP or NUMA-N.

Movie S11.

Time-lapse movie of meiotic maturation of a bovine oocyte expressing EGFP-MAP4 (green, to label microtubules) and H2B-mCherry (magenta, to label chromosomes).

Movie S12.

Time-lapse movie of meiotic maturation of a porcine oocyte expressing EGFP-MAP4 (green, to label microtubules) and H2B-mCherry (magenta, to label chromosomes).

Movie S13

Time-lapse movie of meiotic maturation of a bovine oocyte microinjected with mClover3-MAP4-MTBD (green, to label microtubules), H2B-mScarlet (magenta, to label chromosomes), bTRIM21 and control IgG.

Movie S14

Time-lapse movie of meiotic maturation and bi-directional division of a bovine oocyte microinjected with mClover3-MAP4-MTBD (green, to label microtubules), H2B-mScarlet (magenta, to label chromosomes), bTRIM21 and anti-KIFC1-C.

Movie S15

Time-lapse movie of meiotic maturation and tri-directional division of a bovine oocyte microinjected with mClover3-MAP4-MTBD (green, to label microtubules), H2B-mScarlet (magenta, to label chromosomes), bTRIM21 and anti-KIFC1-C.

Movie S16

Time-lapse movie of meiotic maturation of a non-injected human oocyte stained with 5-SiR-CTX (green, to label microtubules) and SPY555-DNA (magenta, to label chromosomes).

Movie S17

Time-lapse movie of meiotic maturation of a KIFC1-injected human oocyte stained with 5-SiR-CTX (green, to label microtubules) and SPY555-DNA (magenta, to label chromosomes).

Movie S18.

Time-lapse movie of meiotic maturation of mouse oocytes microinjected with mClover3-KIFC1 (green), mScarlet-MAP4-MTBD (magenta, to label microtubules), H2B-miRFP (blue, to label chromosomes), mTRIM21, control IgG or anti-PCNT.