

## Description of Additional Supplementary Files

**File Name: Supplementary Dataset 1.** Summary of all the mass spectrometry proteomic data (two independent experiments) obtained by purifying the GFP-LGN protein complex using a GFP-TRAP-based pulldown in metaphase MCF-10A cells.

**File Name: Supplementary Dataset 2.** Summary of proteins in the LGN subnetwork in metaphase GFP-LGN expressing MCF-10A cells (two independent experiments).

**File Name: Supplementary Dataset 3.** Samples ID numbers and breast tissue donor anonymised information.

### **File Name: Supplementary Movie 1**

**Description: LGN spatiotemporal distribution in control cells.** Clonal MCF-10A cells stably expressing GFP-LGN were transfected with si-Control RNA for 72h and treated with Hoechst as described in the Methods. Images corresponding to 30 planes spaced by 0.6  $\mu\text{m}$  through the cell volume were collected every 3 min as described in the Methods. Maximum intensity projections of GFP-LGN (green) and Hoechst (DNA, magenta) are shown through time. Time in min format and scale bar = 5  $\mu\text{m}$ .

### **File Name: Supplementary Movie 2**

**Description: ANXA1 knockdown impairs the dynamics of LGN and results in its unilateral distribution at the cortex.** Clonal MCF-10A cells stably expressing GFP-LGN were transfected with si-ANXA1#1 RNA for 72h and treated with Hoechst as described in the Methods. Images corresponding to 40 planes spaced by 0.6  $\mu\text{m}$  through the cell volume were collected every 3 min as described in the Methods. Maximum intensity projections of GFP-LGN (green) and Hoechst (DNA, magenta) are shown through time. Time in min format and scale bar = 5  $\mu\text{m}$ .

### **File Name: Supplementary Movie 3**

**Description: ANXA1 knockdown impairs the dynamics of LGN and results in its central distribution at the cortex.** Clonal MCF-10A cells stably expressing GFP-LGN were transfected with si-ANXA1#1 RNA for 72h and treated with Hoechst as described in the Methods. Images corresponding to 40 planes spaced by 0.6  $\mu\text{m}$  through the cell volume were collected every 3 min as described in the Methods. Maximum intensity projections of GFP-LGN (green) and Hoechst (DNA, magenta) are shown through time. Time in min format and scale bar = 5  $\mu\text{m}$ .

### **File Name: Supplementary Movie 4**

**Description: ANXA1 knockdown impairs the dynamics of LGN and results in its circumferential distribution at the cortex.** Clonal MCF-10A cells stably expressing GFP-LGN were transfected with si-ANXA1#1 RNA for 72h and treated with Hoechst as described in the Methods. Images corresponding to 40 planes spaced by 0.6  $\mu\text{m}$  through the cell volume were collected every 3 min as described in the Methods. Maximum intensity projections of GFP-LGN (green) and Hoechst (DNA, magenta) are shown through time. Time in min format and scale bar = 5  $\mu\text{m}$ .

### **File Name: Supplementary Movie 5**

**Description: Mitotic spindle and chromosome dynamics in control cells.** MCF-10A cells were transfected with si-Control RNA for 72h and treated with SiR-tubulin and Hoechst as described in the Methods. Images corresponding to 30 planes spaced by 0.6  $\mu\text{m}$  through the cell volume were collected every 2.5 min as described in the Methods. Maximum intensity

projections of SiR-tubulin (green) and Hoechst (DNA, magenta) are shown through time. Time in min format and scale bar = 5  $\mu\text{m}$ .

**File Name: Supplementary Movie 6**

**Description: ANXA1 knockdown impairs mitotic progression and results in chromosome bridges during anaphase and telophase.** MCF-10A cells were transfected with si-ANXA1#1 RNA for 72h and treated with SiR-tubulin and Hoechst as described in the Methods. Images corresponding to 40 planes spaced by 0.6  $\mu\text{m}$  through the cell volume were collected every 2.5 min as described in the Methods. Maximum intensity projections of SiR-tubulin (green) and Hoechst (DNA, magenta) are shown through time. Time in min format and scale bar = 5  $\mu\text{m}$ .

**File Name: Supplementary Movie 7**

**Description: ANXA1 knockdown impairs mitotic progression and results in misaligned small mitotic spindles.** MCF-10A cells were transfected with si-ANXA1#1 RNA for 72h and treated with SiR-tubulin and Hoechst as described in the Methods. Images corresponding to 40 planes spaced by 0.6  $\mu\text{m}$  through the cell volume were collected every 2.5 min as described in the Methods. Maximum intensity projections of SiR-tubulin (green) and Hoechst (DNA, magenta) are shown through time. Time in min format and scale bar = 5  $\mu\text{m}$ .

**File Name: Supplementary Movie 8**

**Description: ANXA1 knockdown impairs mitotic progression and results in misaligned multipolar mitotic spindles.** MCF-10A cells were transfected with si-ANXA1#1 RNA for 72h and treated with SiR-tubulin and Hoechst as described in the Methods. Images corresponding to 40 planes spaced by 0.6  $\mu\text{m}$  through the cell volume were collected every 2.5 min as described in the Methods. Maximum intensity projections of SiR-tubulin (green) and Hoechst (DNA, magenta) are shown through time. Time in min format and scale bar = 5  $\mu\text{m}$ .