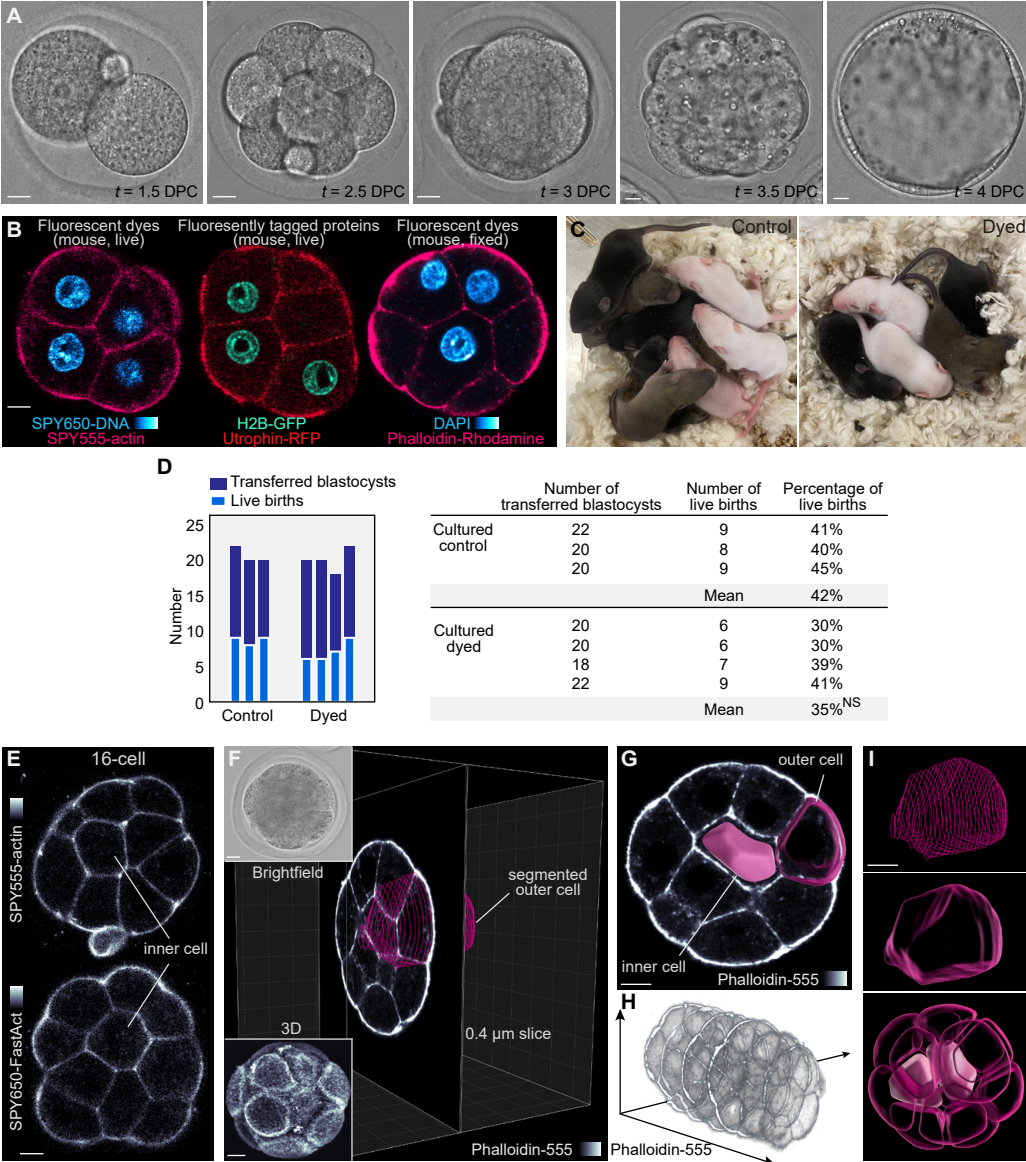
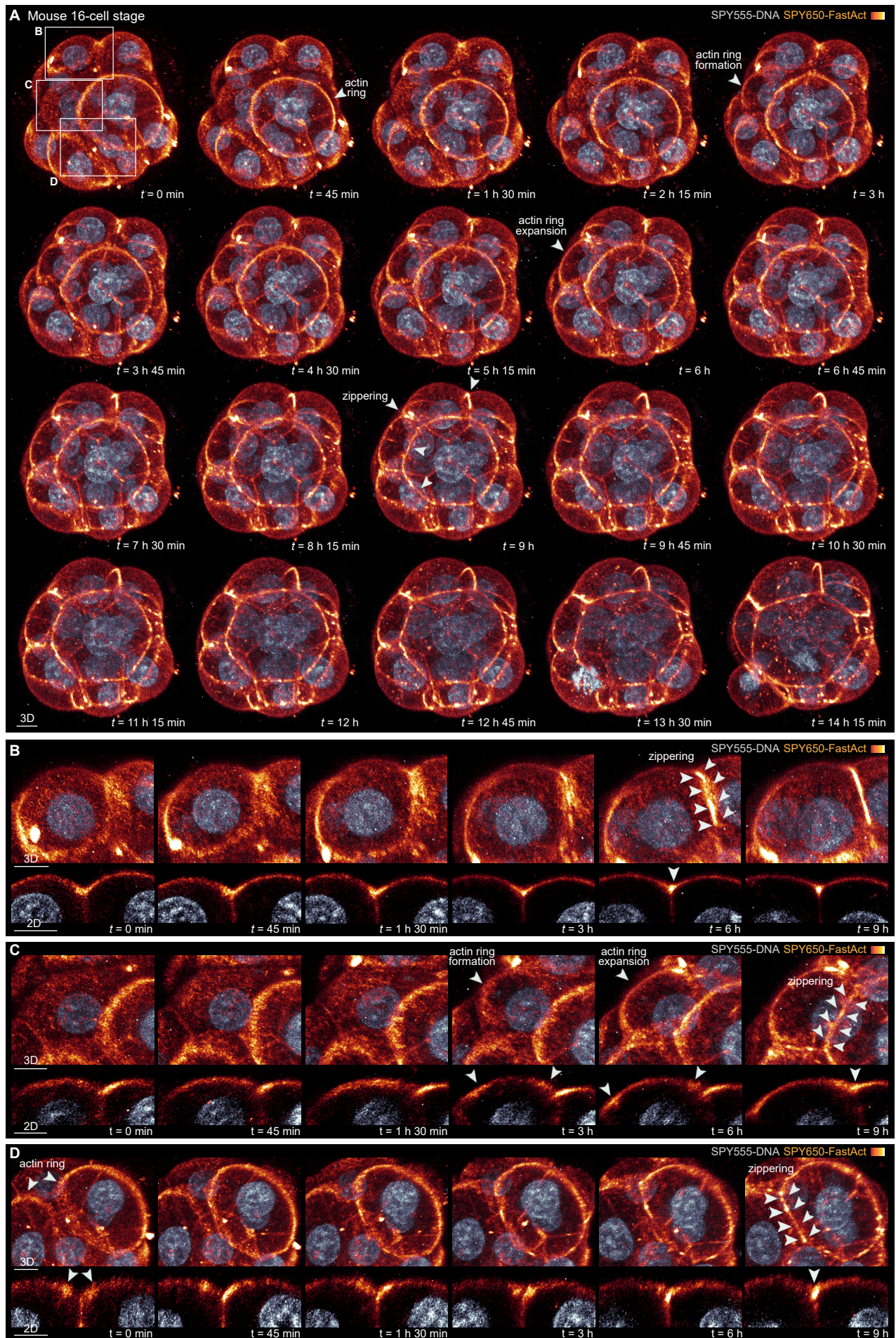


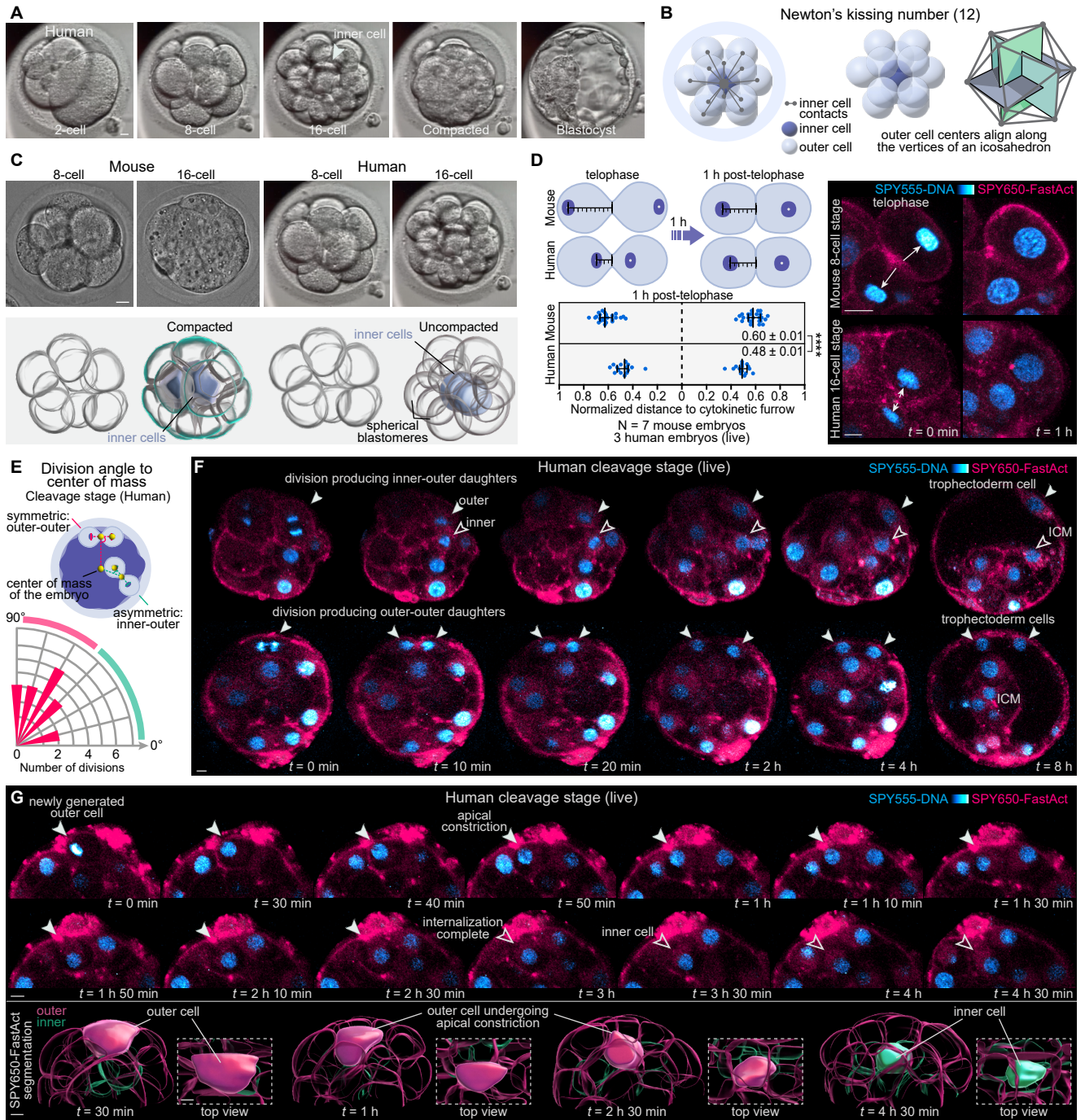
**Figure S1. Additional characterization of fluorescent dyes, related to Figure 1.**



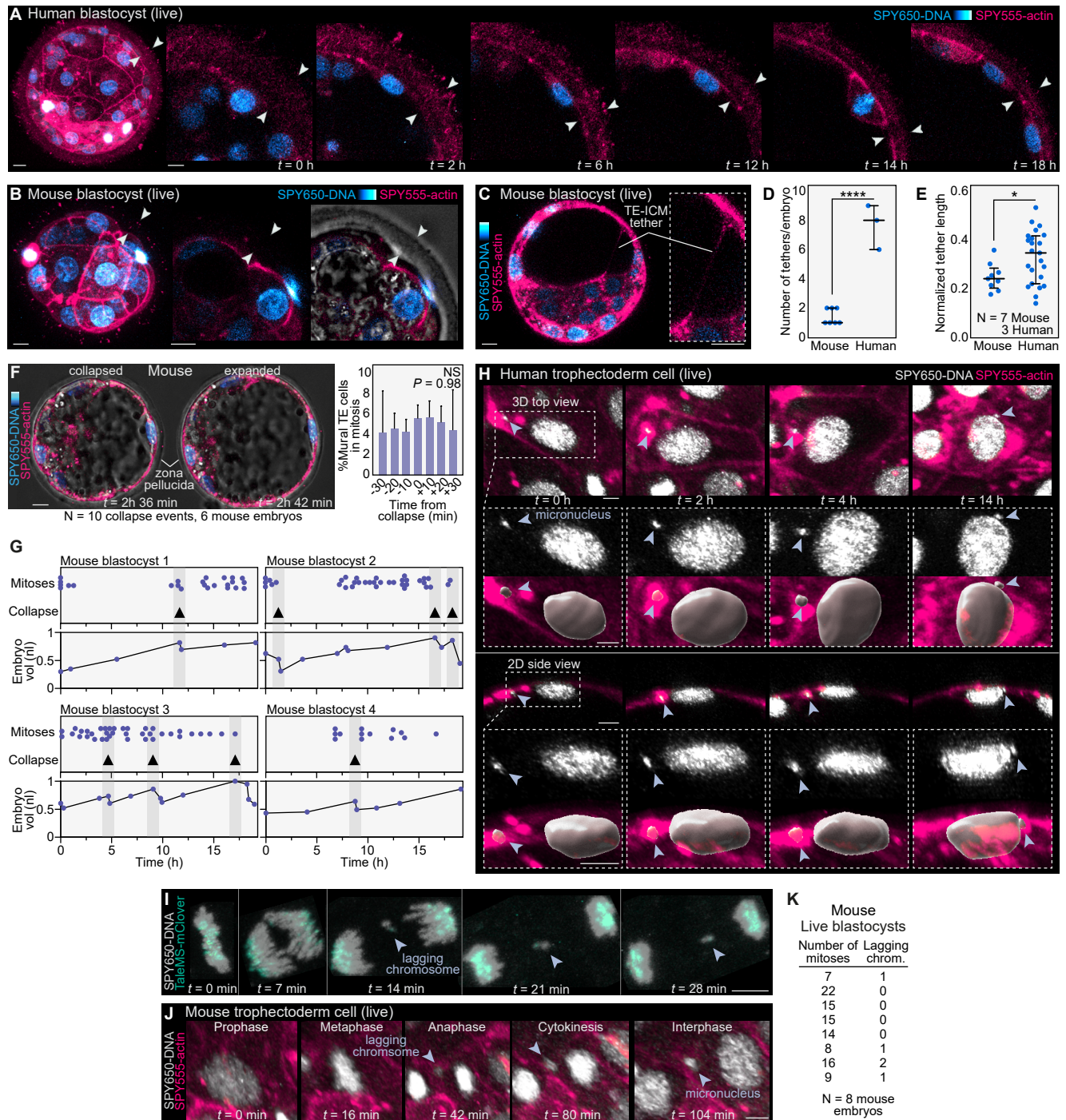
**Figure S2. Embryos dyed with SPY555-DNA and SPY650-FastAct display normal actin ring expansion and zippering, related to Figure 1**



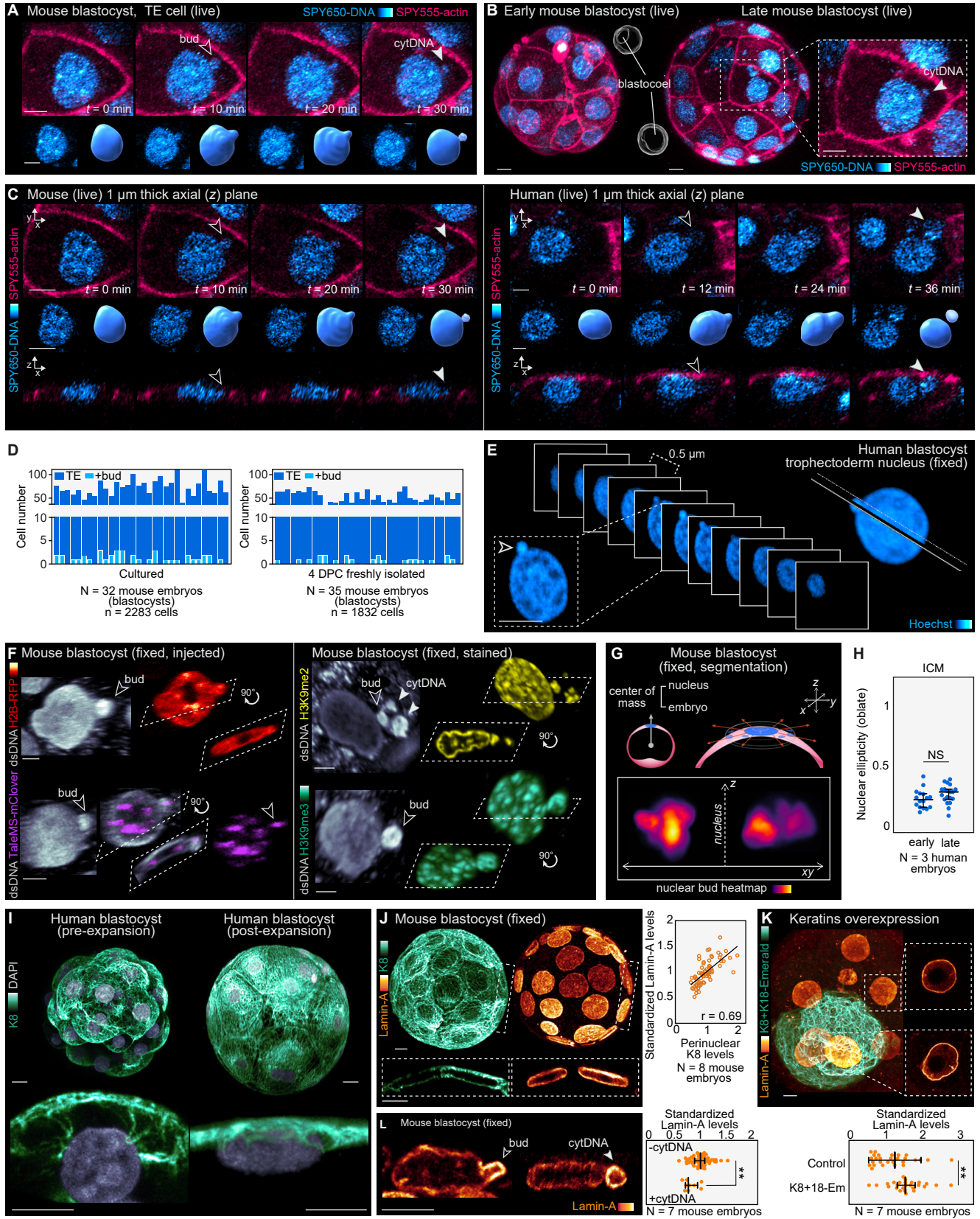
**Figure S3. Compaction and early inner cell allocation in human embryos, related to Figure 2.**



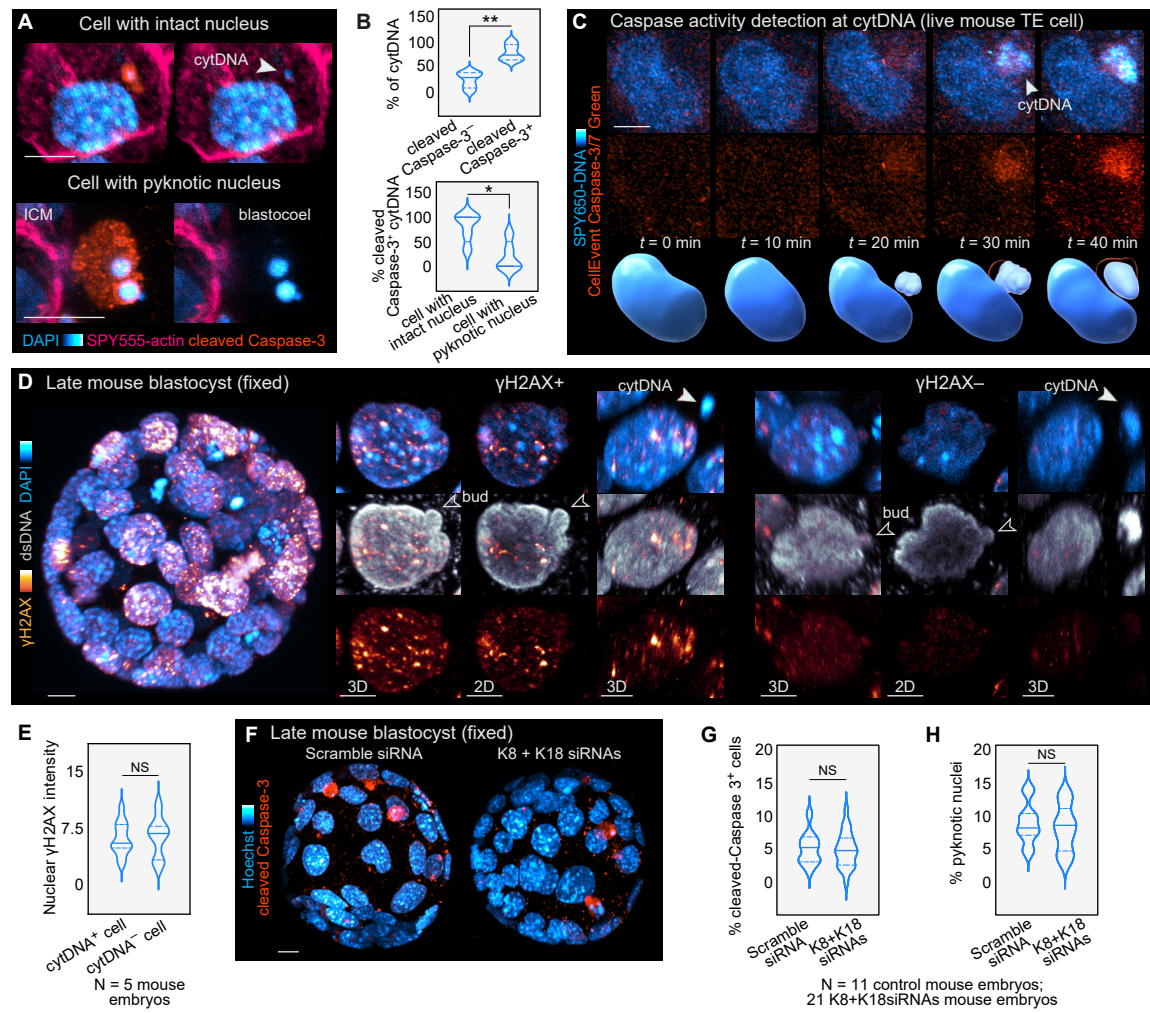
**Figure S4. Analysis of blastocyst structures and chromosome segregation errors during mitosis in the living embryo, related to Figure 3 and Figure 4.**



**Figure S5. Additional characterization of nuclear buds and cytDNA structures, related to Figure 5.**



**Figure S6. Analysis of caspase activity and  $\gamma$ H2AX, related to Figure 5.**



**Figure S7. Nuclear budding during blastocyst hatching and trophoblast biopsy, related to Figure 5 and Figure 6.**

