Supplementary Information

Gene	Forward (5'-3')	Reverse (5'-3')
ActB	GCTCTTTTCCAGCCTTCCTT	CGGATGTCAACGTCACACTT
Carm1	CCTGTGGTGGACACATTTGA	TCGCCTTCTTTGGCTTCTAA
Cdx2	TCAAGAAGAAGCAGCAGCAG	GCAAGGAGGTCACAGGACTC
Ecad	AGACTTTGGTGTGGGTCAGG	CATGCTCAGCGTCTTCTCTG
EMK1	TGTGGAACCTCTCCCTGA	CCCATTGACACCATCAACTCT
Par3	AGCCTTCTGGTCTTTCGTCA	GGGTGTGAGAACAACGTCCT
aPKC	TGGGTGGACAGTGAAGGTGAC	GTTGGCTCGGTACAGCTTC
PKCII	as 'aPKC Forward'	ATTGGCTCGGTACGGCTTT

Table 1. Primer pairs used in qRT-PCR (see Materials and Methods)

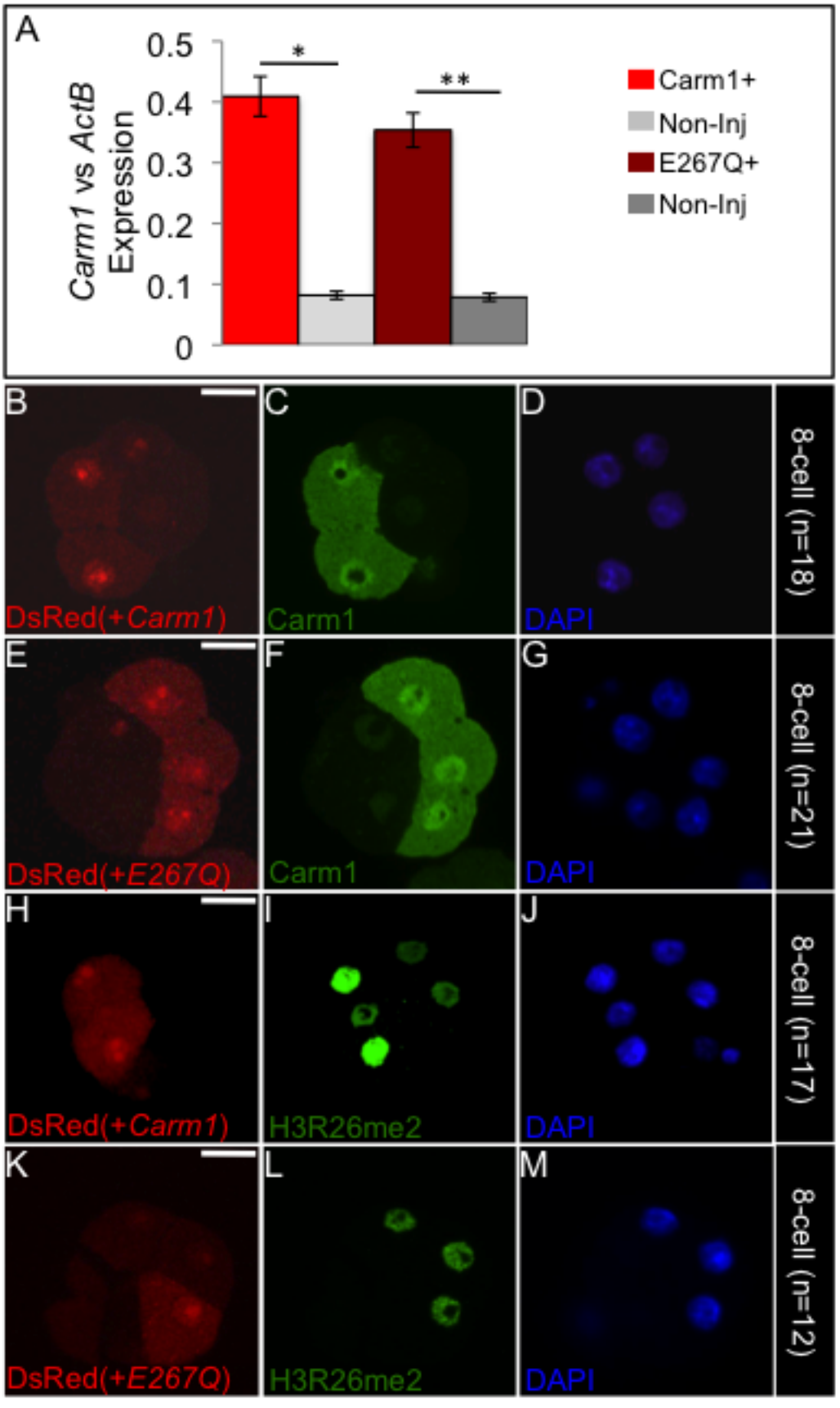
Supplementary Figure 1. Confirmation of functional Carm1 overexpression. (**A**) One 2-cell blastomere was injected with *DsRed* and either *Carm1* or *Carm1(E267Q)* mRNAs and cultured until being separated at the mid-8-cell stage into non-labelled/labelled blastomeres. These were pooled separately and used for qRT-PCR. Normalised averages of biological and technical triplicate are shown. Error bars = SEM. Transcripts detected using Carm1 primers were significantly higher in *Carm1* and *Carm1*(*E267Q)* injected blastomeres than their non-injected counterparts (Student's T-test; *p=0.0061 and **p=0.0032 respectively). (**B-M**) Embryos were treated as above, but fixed at the 8-cell stage and treated with antibodies for Carm1 (C and I) or H3R26me2 (F and L). DsRed indicates blastomeres injected with *Carm1* (B, E) or *Carm1*(*E267Q)* mRNA (H, K). Nuclei are visualised with DAPI (D, G, J and M). Scale bar = 20μm. Carm1 protein and H3R26me2 levels were increased after *Carm1* injection (n=18 and 17 embryos respectively). Increased Carm1 protein was detected after *E267Q* blastomere injection (n=21 embryos), but no change in H3R26me2 was apparent in these blastomeres (n=12 embryos).

Supplementary Figure 2. *Carm1* overexpression leads to an increased frequency of asymmetric blastomere division and increased inner cells at the blastocyst stage. H2B-EGFP expressing zygotes were injected with mRNA for *dsRed* and *Carm1*, thus artificially elevating the levels of these transcripts in all cells of the embryo. (**A**) Injected embryos were time-lapse imaged to the blastocyst stage, tracked using Simibiocell© software, and DIC and H2B-EGFP Z-stacks used to determine blastomere positions as in Figure 1C. Average proportions of asymmetric and symmetric divisions during 4^{th} and 5^{th} cleavage for these embryos (n=10) were higher when compared to those of non-manipulated embryos (Bischoff et al., 2008). Error

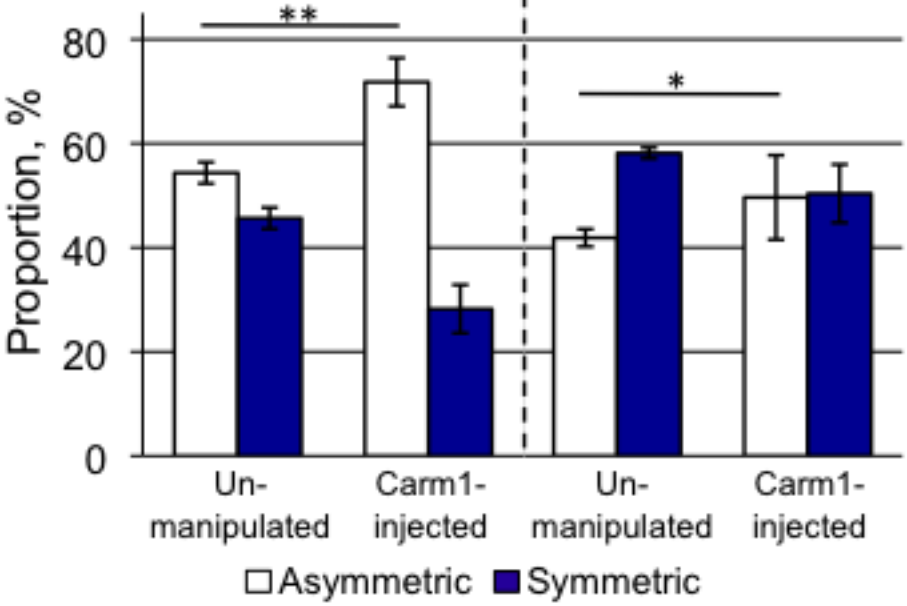
bars=SEM. Student's T-Tests: **p<0.001, *p=0.04. (**B**) After time-lapse microscopy, all cells were scored as inner/outer for each embryo and DsRed positive/negative. (**C**) The proportion of inner and outer cells in each blastocyst after *Carm1* overexpression in the zygote or one 2-cell stage blastomere, and *Carm1*(*E267Q*) in one 2-cell stage blastomere. The embryos injected with *Carm1* at the zygote stage had significantly more inner cells than those injected at the 2-cell stage.

Supplementary Figure 3. *E-Cadherin* expression levels do not change in response to *Carm1* overexpression. Separated 8-cell blastomeres injected with *Carm1* or *Carm1(E267Q)* and *DsRed* mRNAs at the 2-cell stage were pooled into non-injected (Non-Inj) and injected (+) samples used for qRT-PCR. Normalised averages of biological and technical duplicate are shown. Error bars=SEM. *E-Cad* transcripts were statistically equal in *Carm1*-injected, *(Carm1)E267Q*-injected and both non-injected samples (Two-way ANOVA, p=0.087).

Supplementary Movie. Time-lapse movie of embryo overexpressing Carm1 in one 2-cell blastomere, from Figure 1. 3D reconstruction of localisation of blastomeres' nuclei from the 2-cell to blastocyst stage (right panel); DIC movie of the same embryo (left panel). The nuclei from each clone are marked either red (*Carm1* mRNA clone) or white (non-injected clone). From the 16-cell-stage onwards, nuclear centres of inside cells are marked purple (*Carm1* overexpressing clone) or light blue (non-injected clone).


A
Carm1 vs ActB Expression
0.5
0.4
0.3
0.2
0.1
0
*
**
Carm1+
Non-Inj
E267Q+
Non-Inj
B
C
D
8-cell (n=18)
DsRed(+Carm1)
Carm1
DAPI
E
F
G
8-cell (n=21)
DsRed(+E267Q)
Carm1
DAPI
H
I
J
8-cell (n=17)
DsRed(+Carm1)
H3R26me2
DAPI
K
L
M
8-cell (n=12)
DsRed(+E267Q)
H3R26me2
DAPI

A



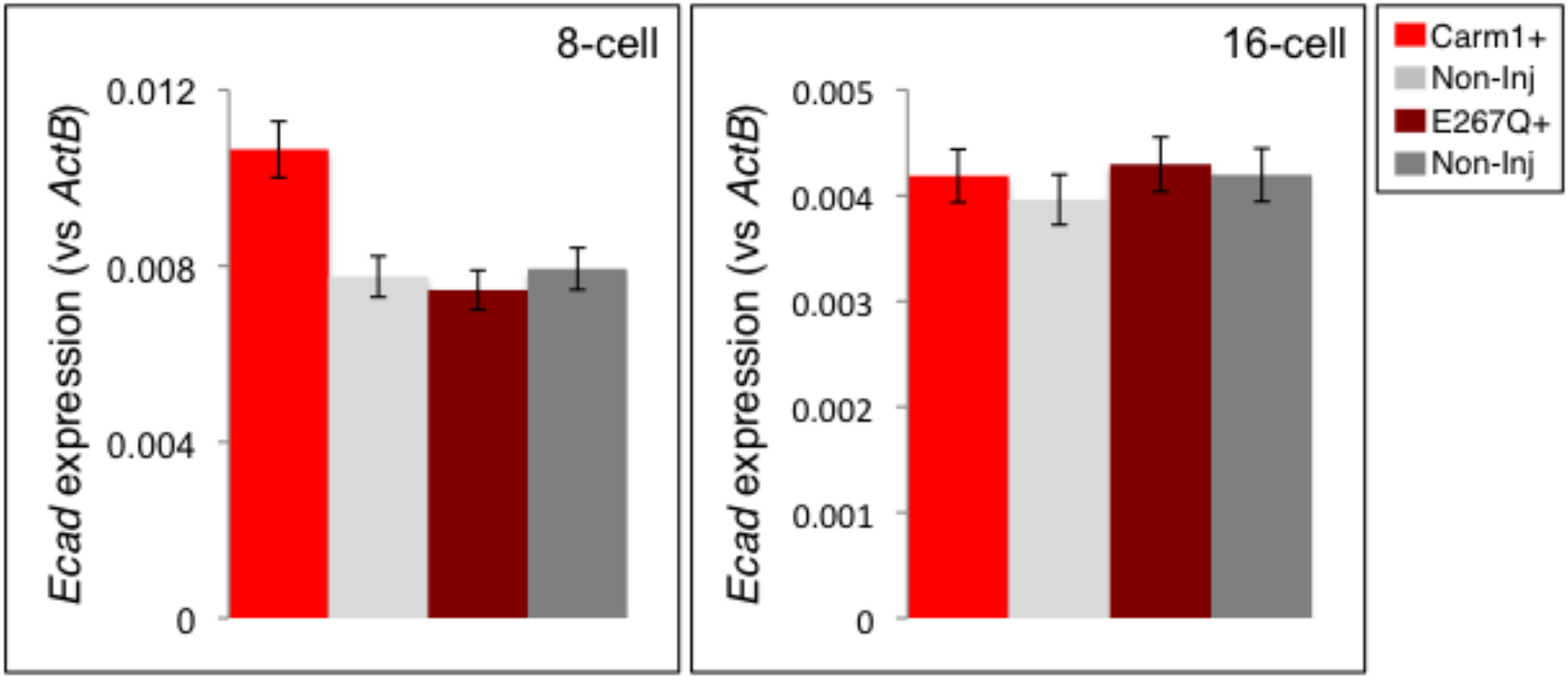
B

Embryo	No. of Cells	No. of Inner (% of total)	No. of Outer (% of total)
Zygote 1	32	13 (41)	19 (59)
Zygote 2	32	15 (47)	17 (53)
Zygote 3	32	15 (47)	17 (53)
Zygote 4	32	12 (38)	20 (62)
Zygote 5	33	14 (42)	19 (58)
Zygote 6	31	14 (45)	17 (55)
Zygote 7	32	15 (47)	17 (53)
Zygote 8	32	14 (44)	18 (56)
Zygote 9	32	14 (44)	18 (56)
Zygote 10	34	14 (42)	20 (58)
MEAN	32.2	14.0 (43)	18.2 (57)
SD	0.8	0.9	2.9

C

		Inner cells (% ±SD)	Outer cells (% ±SD)
Stage of embryos injected (mRNA)	Zygote (*Carm1*)	43.5 ±2.9*^	56.5 ±2.9
	2-Cell (*Carm1*)	39.0 ±4.9*	60.3 ±4.9
	2-Cell (*E267Q*)	38.2 ±2.0^	61.8 ±2.2

Student's T-Test: *p=0.0097, ^p=0.0002


8-cell
16-cell
Ecad expression (vs ActB)
0.012
0.008
0.004
0
0.005
0.004
0.003
0.002
0.001
0
Carm1+
Non-Inj
E267Q+
Non-Inj