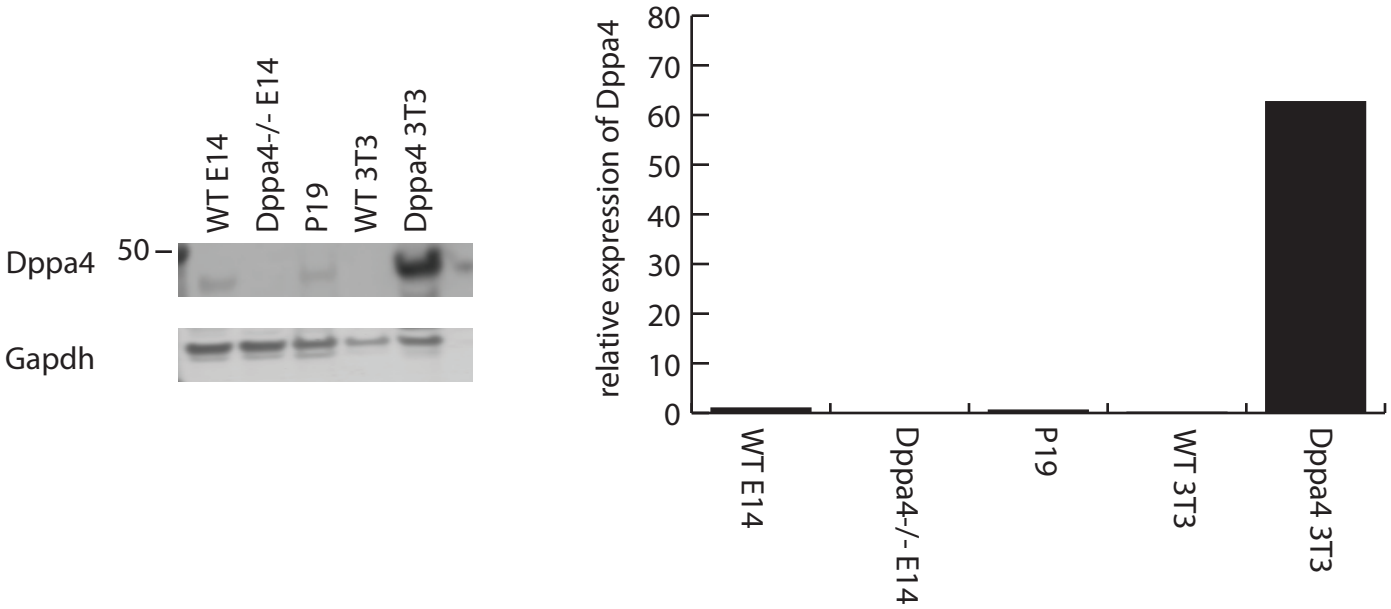
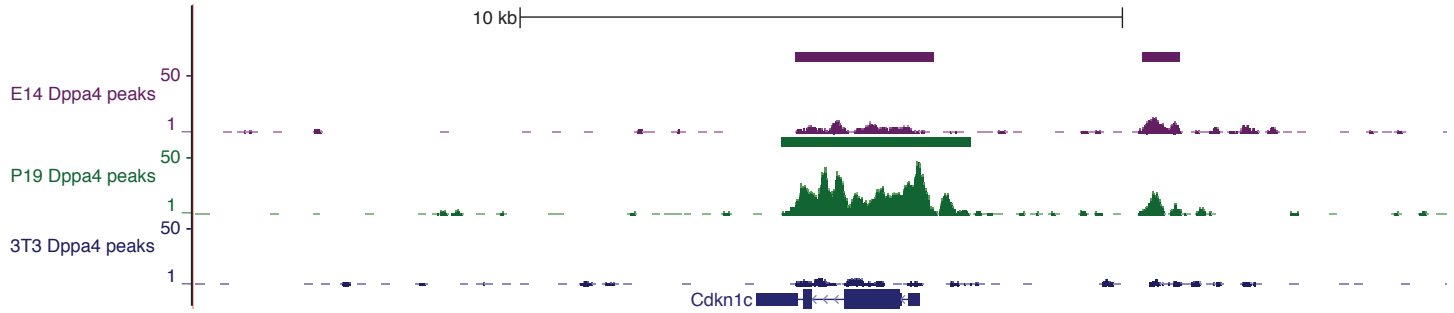
Supplemental Figure 1

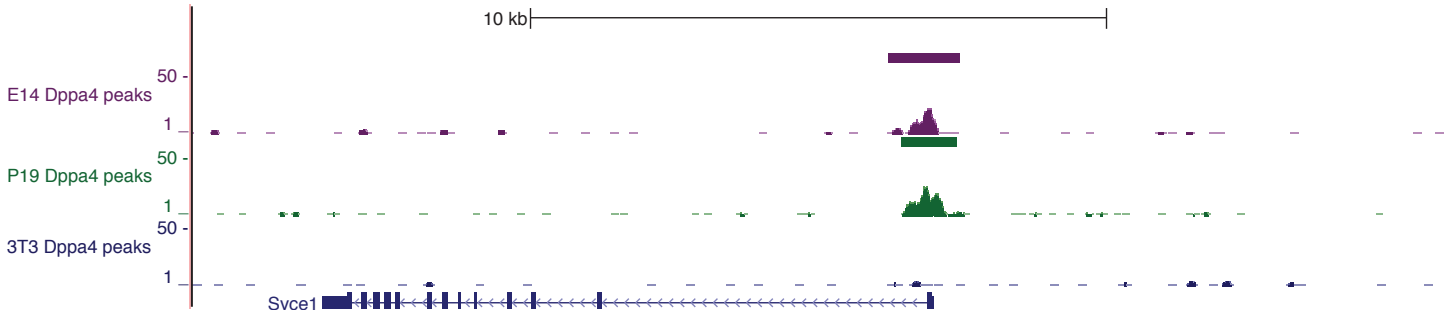


Supplemental Figure 2

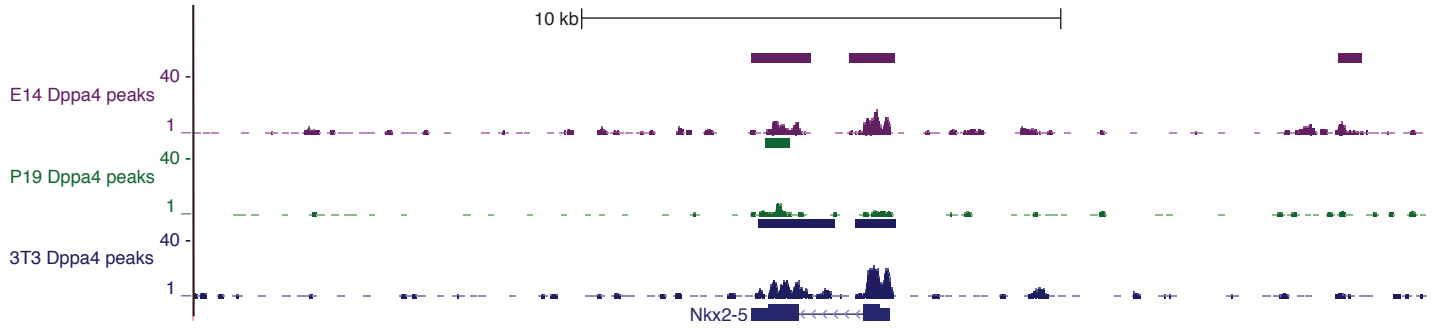
**A.**




**B.**

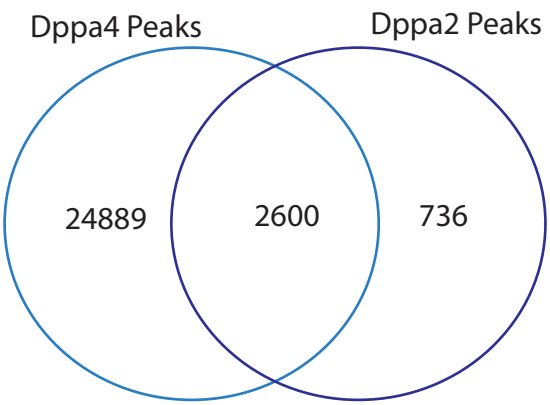



**C.**

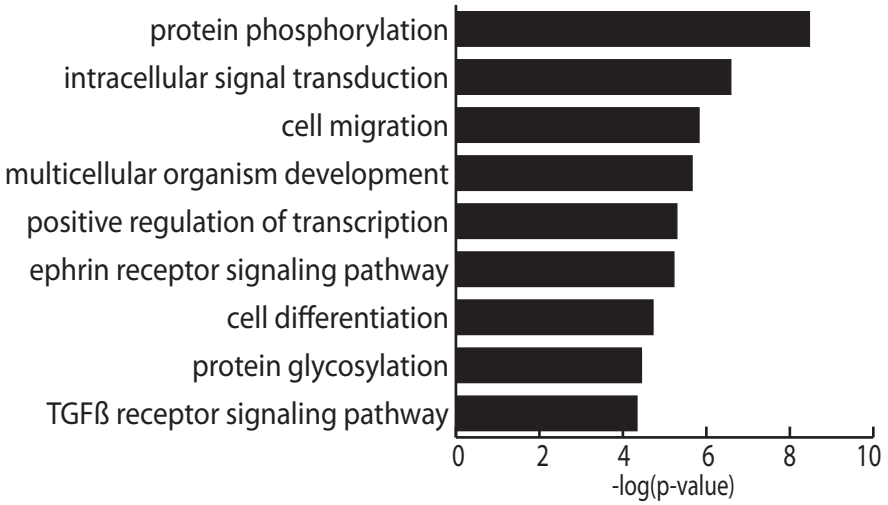


Supplemental Figure 3

**A.** Dppa4 and Dppa2 Overlap

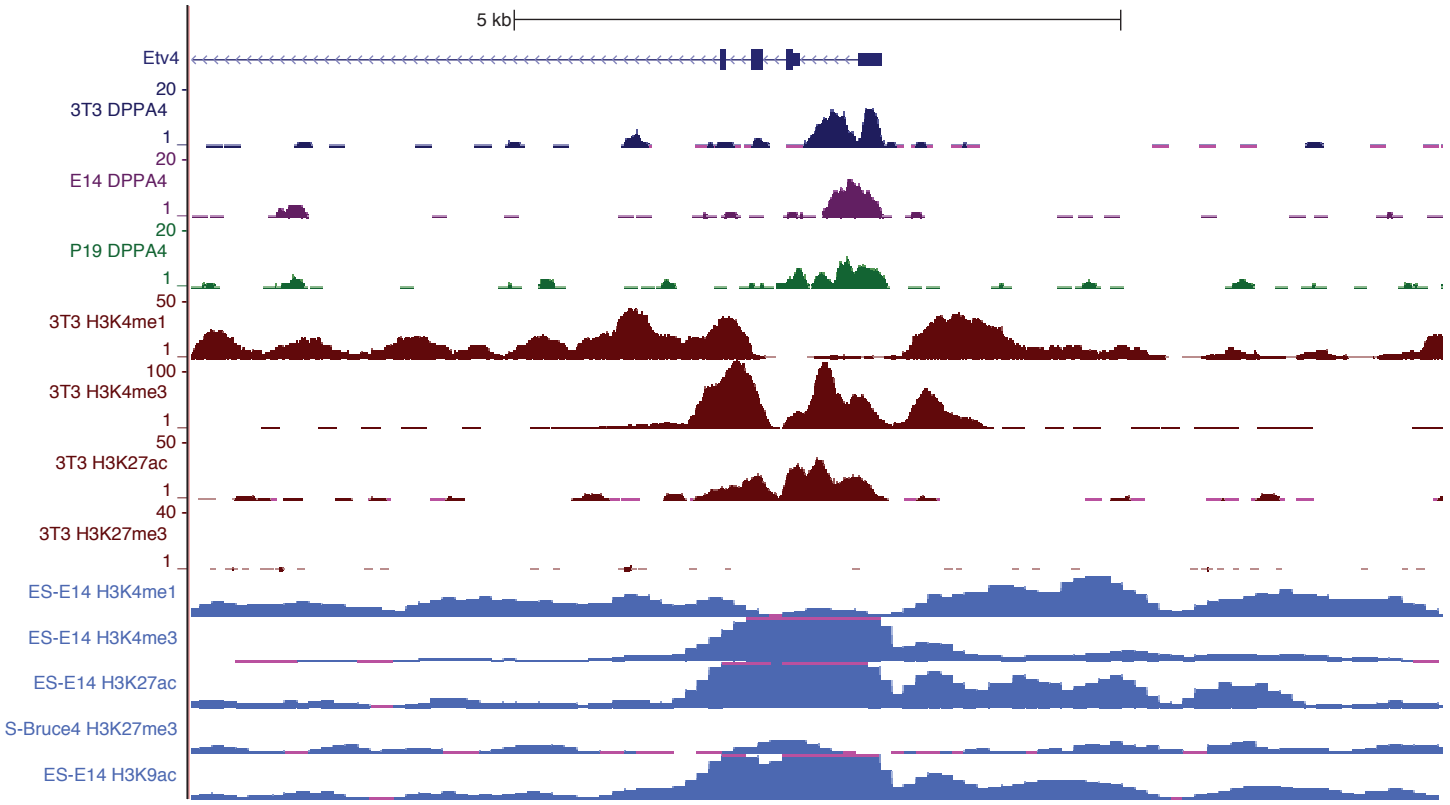



**B.** **GO for Dppa4-Dppa2 Overlapping Targets**

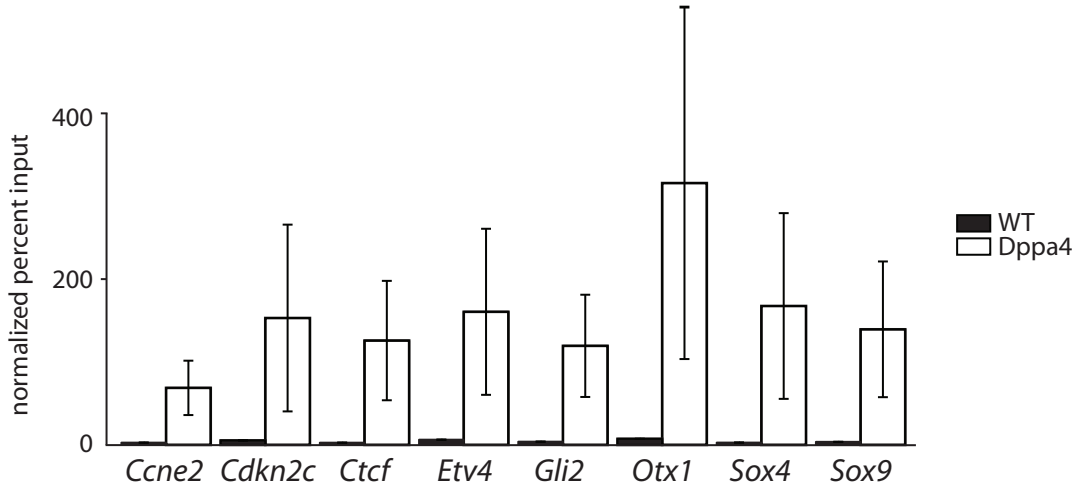


Supplemental Figure 4

A.

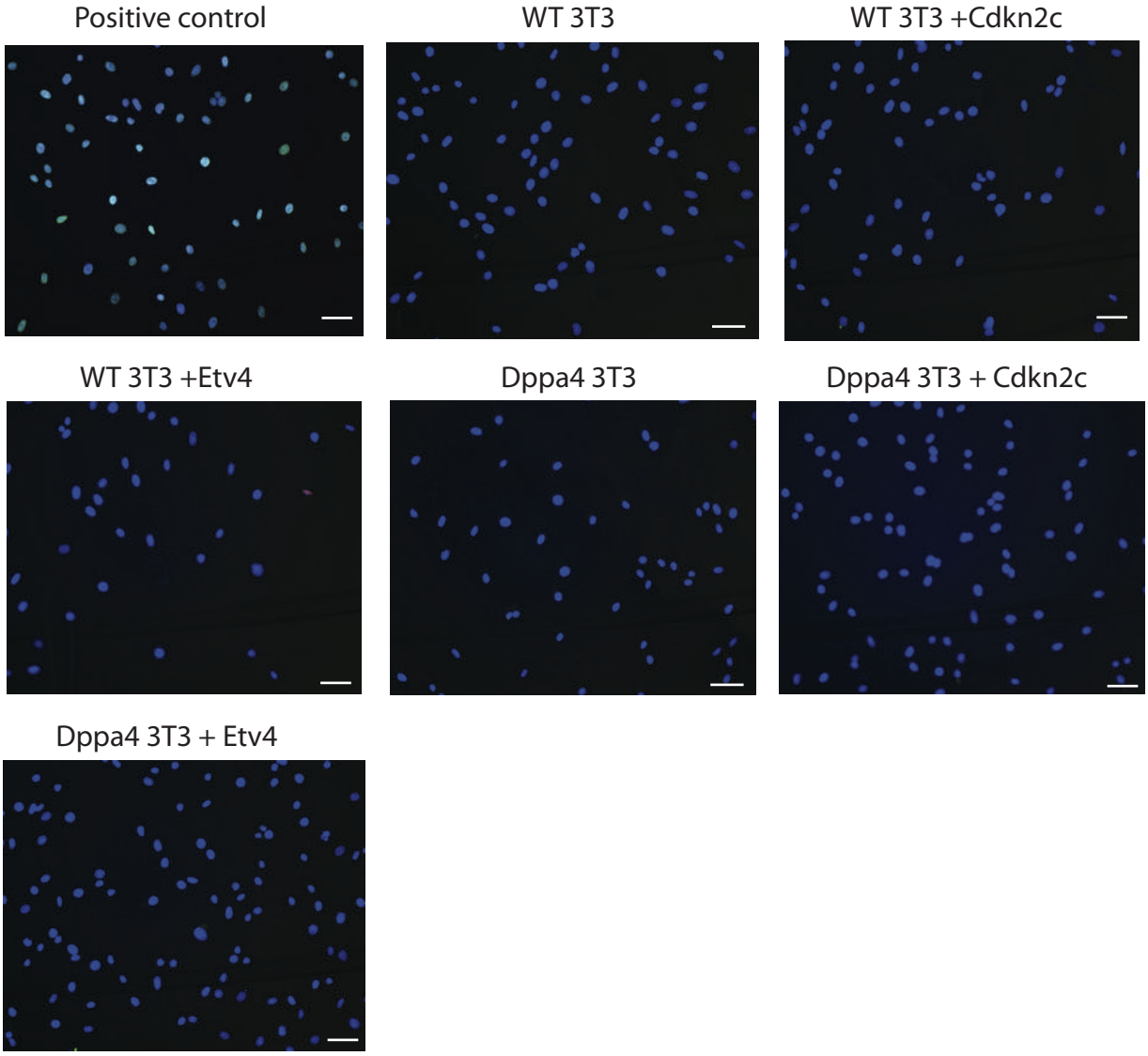



B.

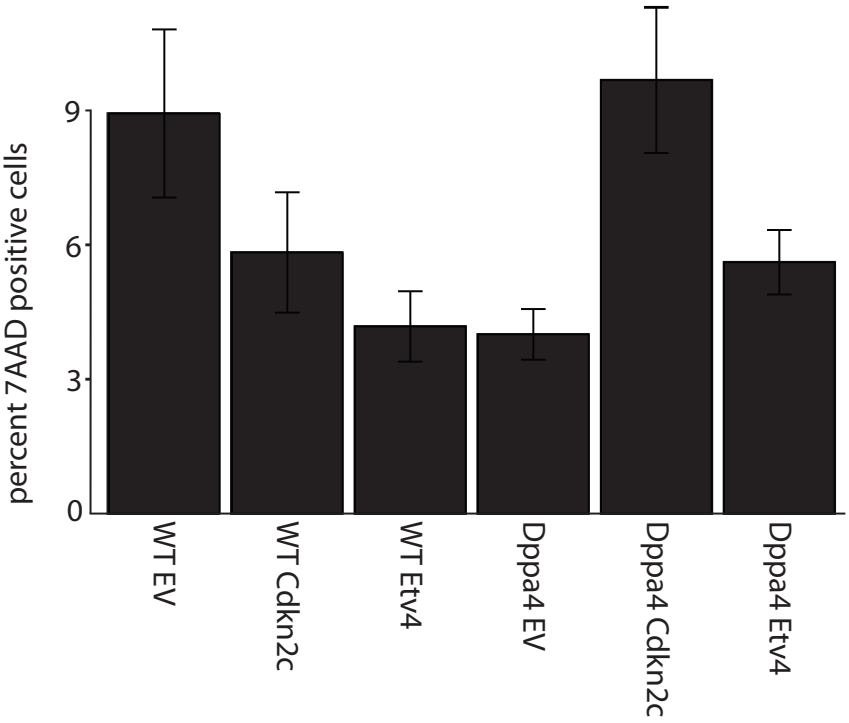


Supplemental Figure 5

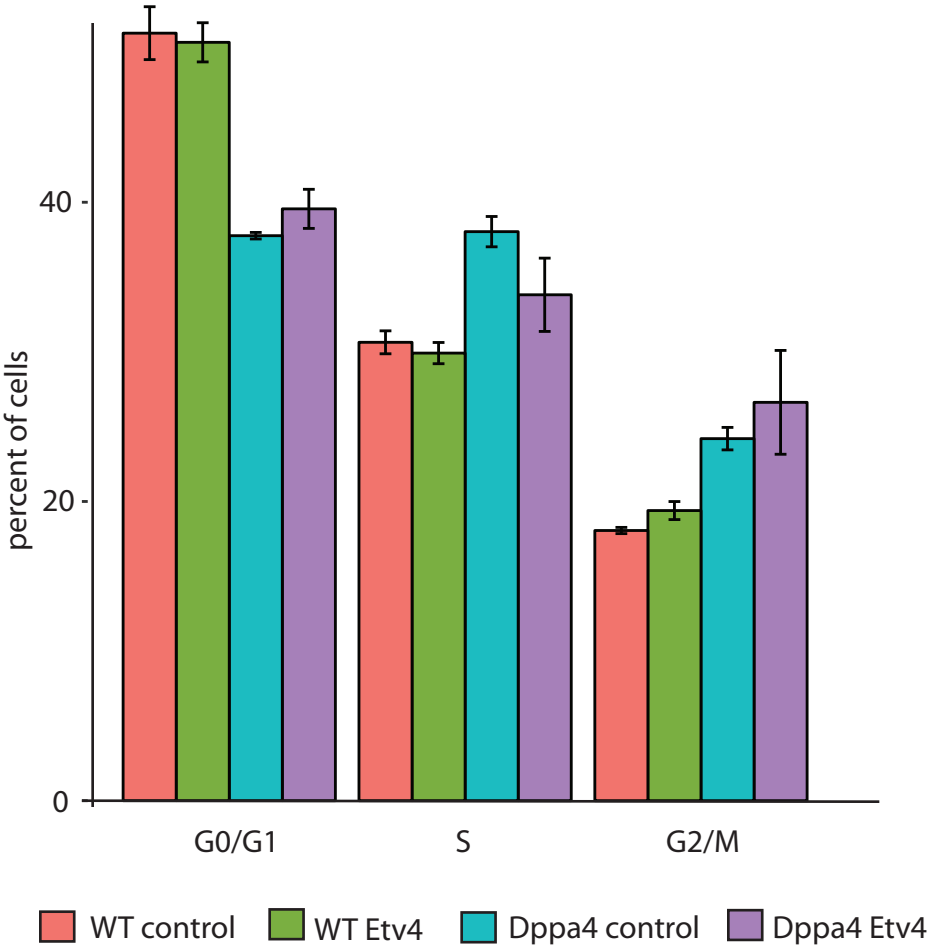
A.



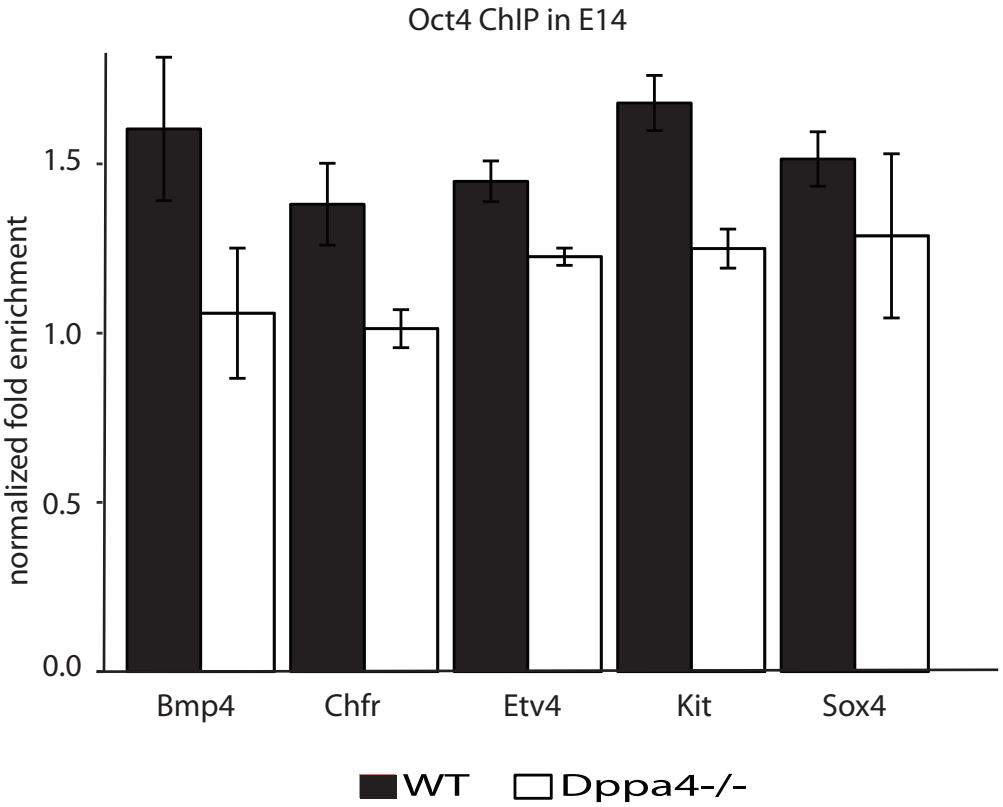

B.



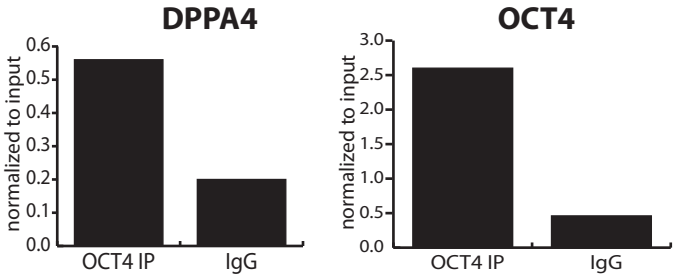
Supplemental Figure 6



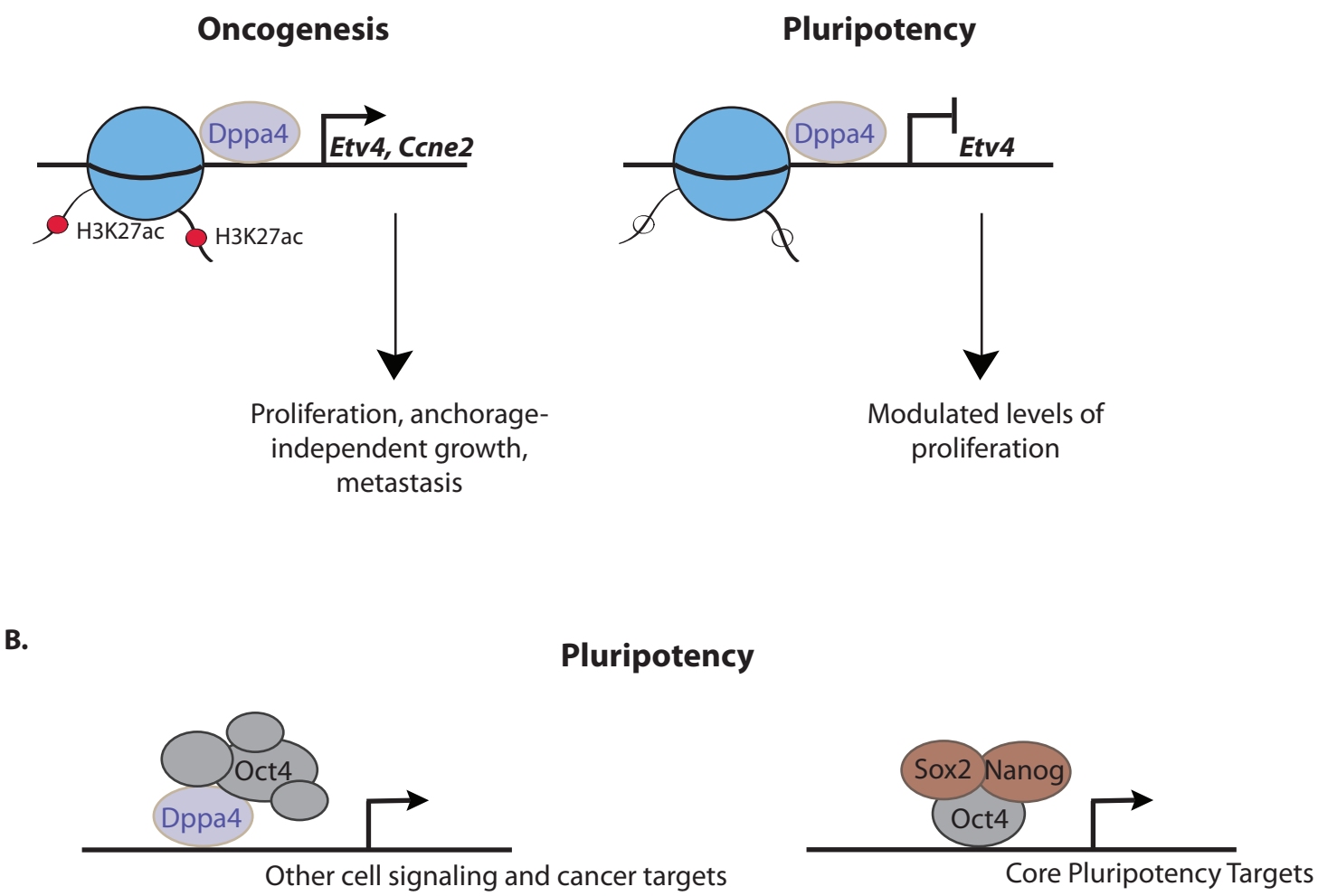
Supplemental Figure 7



Supplemental Figure 8



Supplemental Figure 9



**Supplemental Table 1. List of Primer Sequences.**

| Mouse ChIP primers | Sequence |
|---|---|
| mSox4 chip f | GACTGCTCCATGATCTTGCG |
| mSox4 chip r | GAGAACACTGAGGCTCTGCT |
| mPtch1 chip f | CGCCTTCCATTGCCACATT |
| mPtch1 chip r | CTTCCCGCGAGCTGGATG |
| mPtch1 2 chip f | TCATCACAGTGCGCACAAC |
| mPtch1 2 chip r | AGGAATGTACTACGGCGTGT |
| mCtcf chip f | TCTTCCCTTATCAGCACCCG |
| mCtcf chip r | CGGTTTAATCGCTCCACAGG |
| mEtv4 chip f | GGATCGGACAGCGAAACTTC |
| mEtv4 chip r | CGCACACACACGTCTTATGT |
| mEtv4 2 chip f | GTGTGTGTGTGTATGTGGGC |
| mEtv4 2 chip r | ACCACACTCTCTCTGTTCGG |
| mCcne2 chip f | TCCGGCGTGTTTACATTCTG |
| mCcne2 chip r | GGAACCCCAAGTCTCCTCAG |
| mCdk5r1 chip f | CTGGTTGGATTCCTGCTGC |
| mCdk5r1 chip r | CGGATCTGCGTGGAAAACAA |
| mCdk5- chip f | TAAGCAGTTAGGTGGCGGAG |
| mCdk5- chip r | TTTCCTCCAGTTCCACTCCC |
| mChIP Cdkn2c F | TGTGCCGGTTTCTTATCCCT |
| mChIP Cdkn2c R | GCCTCCTTAAAACTCTGCCG |
| mChIP Cdkn2c 2F | TTTCCATCCGTCTAGCCGAA |
| mChIP Cdkn2c 2R | TCGTCTTTAACCCTCCCGAG |
| mChIP Kit F | ATCTGCTCTGCGTCCTGTT |
| mChIP Kit R | AGGTGGTAGGCATGGGAAAA |
| mChIP Rnf17 F | TCCAGGATAAAAGCCCAGCA |
| mChIP Rnf17 R | CGCGTCAAGAACCAATCACA |
| mChIP Chfr F | GGCAACAAGGTGCACATTCT |
| mChIP Chfr R | CTAGAGCGGTGCCAGAAAAG |
| mChIP Bmp4 F | CGAATGGCACTACGGAATGG |
| mChIP Bmp4 R | TGACTCCTAGGGGCTGGAA |
| mChIP Negative control F | GACTACTTACTGCTGGCTTCA |
| mChIP Negative control R | GTTAACCAAGACCAGTTTGCAT |
| mChIP Cbx2 F | TCAGGCAGGAGTCTGGCTAT |
| mChIP Cbx2 R | TCCCACCCCTTAGATCTCCT |
| mChIP Oct4 F | GCACTTCTCTGGGGTCTCTG |
| mChIP Oct4 R | ACCCACCCGTCTAGAGTCCT |
| mChIP Oct4 F1 | TGGTGAAGTCGATGAAGCTG |
| mChIP Oct4 R1 | GAGCTGTTGGCTAGGGTCAG |
| mChIP Nanog F | ACCCAGGAAGAACCACTCCT |
| mChIP Nanog R | GTTTGCCGATCAGTCCTTGT |

| | |
|---|---|
| mChIP Sox9 F | AGATAAGTTCCCCGTGTGCA |
| mChIP Sox9 R | TGACGTGTGGCTTGTTCTTG |
| mChIP Gli2 F | AGAAGGAAGACACGTGGGTT |
| mChIP Gli2 R | AGAAAGACCCCTCTCACTGC |
| mChIP Gli3 F | ATGTGTCTGTGTGAGGACCC |
| mChIP Gli3 R | CTTTGCTTTCCCGCTCCTTT |
| mChIP Otx1 F | CTCTGGGTCTAGGTTGGCAA |
| mChIP Otx1 R | GGTTATCCAGCAGCTTGACG |
| mChIP Syce1 F | AAGCAGTGTTTGGCCAGTTT |
| mChIP Syce1 R | ATCACCGTTCTGTCTGAGGG |
| **Mouse qPCR Primers** | **Sequence** |
| mRT Dppa4 F | GTCTAGTCAACCAAGCACGG |
| mRT Dppa4 R | CCTTTGCTGCTCACTCGTTT |
| mRT Dppa4 F2 | CAAGAAGTGGAGCGCAGAAG |
| mRT Dppa4 R2 | TTCCTACGAGTCTGTCCTGG |
| mRT Chfr F | GCAGACTTACCCTTTACAGAGC |
| mRT Chfr R | CCTGAGCAATCTTTGGTCACAT |
| mRT Kit F | CTCCCCCAACAGTGTATTCAC |
| mRT Kit R | TAGCCCGAAATCGCAAATCTT |
| mRT Rnf17 F | GACACACAGTCTAACAGAGGC |
| mRT Rnf17 R | TCATAGCTGCATCCAAATCACTT |
| mRT Bmp4 F | TTCCTGGTAACCGAATGCTGA |
| mRT Bmp4 R | CCTGAATCTCGGCGACTTTTT |
| mETV4 RT F | CGGAGGATGAAAGGCGGATAC |
| mETV4 RT R | TCTTGGAAGTGACTGAGGTCC |
| mEIF4B RT F | ACGGACTTTCTAGCTGAGGAT |
| mEIF4B RT R | CGTCATCATCGTTACTATGCCAA |
| mCCNE2 RT F | ATGTCAAGACGCAGCCGTTTA |
| mCCNE2 RT R | GCTGATTCCTCCAGACAGTACA |
| mIRS2 RT F | CTGCGTCCTCTCCCAAAGTG |
| mIRS2 RT R | GGGGTCATGGGCATGTAGC |
| mCDK5 RT F | CCCTGAGATTGTGAAGTCATTCC |
| mCDK5 RT R | CCAATTTCAACTCCCCATTCCT |
| mCDK5R1 F | CTGTCCCTATCCCCCAGCTAT |
| mCDK5R1 R | GGCAGCACCGAGATGATGG |
| mSOX4 RT F | CGGCTGCATCGTTCTCTCC |
| mSOX4 RT R | CGCTTCACTTTCTTGTCGGC |
| mPTCH1 RT F | AAAGAACTGCGGCAAGTTTTTG |

| | |
|---|---|
| mPTCH1 RT R | CTTCTCCTATCTTCTGACGGGT |
| mRXRB RT F | CAAACGGCTCTGTGCAATCTG |
| mRXRB RT R | GGTCAGGTCCTTCCGAATGG |
| mCDKN1C RT F | GCAGGACGAGAATCAAGAGCA |
| mCDKN1C RT R | GCTTGGCGAAGAAGTCGTT |
| mCDKN2C RT F | CCTTGGGGGAACGAGTTGG |
| mCDKN2C RT R | AAATTGGGATTAGCACCTCTGAG |
| mCTCF RT F | GATCCTACCCTTCTCCAGATGAA |
| mCTCF RT R | GTACCGTCACAGGAACAGGT |
| | |

**Supplemental Table 2. Overlap of Dppa4 binding and chromatin domains in 3T3 cells**

| Chromatin Domain | Dppa4 Peaks | Random Regions | Fold Enrichment |
|---|---|---|---|
| H3K4me3 | 6216 | 130 | 47.82 |
| H3K4me1 | 1817 | 437 | 4.16 |
| H3K27ac | 5572 | 178 | 31.30 |
| H3K36me3 | 13 | 5 | 2.60 |
| H3K9me3 | 32 | 22 | 1.45 |
| H3K27me3 | 22 | 2 | 11.00 |
| Bivalent | 13 | 1 | 13.00 |
| Enhancers | 166 | 60 | 2.77 |
| CpG Islands | 7419 | 42 | 176.64 |
| CTCF | 1232 | 96 | 12.83 |
| Total Dppa4 Peaks | 8319 | 8319 | -- |

**Supplemental Table 3. Overlap of Dppa4 binding and chromatin domains in mESC**

| Chromatin Domain | Dppa4 Peaks | Random Regions | Fold Enrichment |
|---|---|---|---|
| H3K4me3 | 10487 | 425 | 24.66 |
| H3K4me2 | 13171 | 961 | 13.70 |
| H3K4me1 | 8763 | 1169 | 7.50 |
| H3K27ac | 4218 | 399 | 10.57 |
| H3K79me2 | 587 | 93 | 6.31 |
| H3K36me3 | 508 | 179 | 2.83 |
| H3K9me3 | 166 | 33 | 5.08 |
| H3K27me3 | 2675 | 118 | 22.73 |
| Bivalent | 1714 | 63 | 27.21 |
| Enhancers | 135 | 367 | 0.37 |
| DNaseI hypersensitive | 6923 | 560 | 12.36 |
| CpG Islands | 8046 | 123 | 65.24 |
| Total Dppa4 Peaks | 27489 | 27489 | -- |

**Supplemental Table 4. Overlap of Dppa4 binding and chromatin domains in P19 cells**

| Chromatin Domain | Dppa4 Peaks | Random Regions | Fold Enrichment |
|---|---|---|---|
| H3K4me3 | 5779 | 342 | 16.90 |
| H3K4me2 | 9731 | 683 | 14.25 |
| H3K4me1 | 5393 | 1544 | 3.49 |
| H3K27ac | 1279 | 123 | 10.40 |
| H3K9ac | 2195 | 163 | 13.47 |
| H3K27me3 | 246 | 24 | 10.25 |
| Bivalent | 204 | 8 | 25.5 |
| Enhancers | 211 | 54 | 3.91 |
| CpG Islands | 6959 | 112 | 62.1 |
| Total Dppa4 Peaks | 8319 | 8319 | -- |