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Supplemental Information

H19, a Long Non-coding RNA, Mediates Transcription Factors and Target Genes through Interference of MicroRNAs in Pan-Cancer

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SUPPLEMENTARY FILES

Figure S1. H19 highly expressed across pan-cancer except for brain lower grade glioma (LGG), prostate adenocarcinoma (PRAD), and thyroid carcinoma (THCA).

Figure S2. TF-gene regulation was affected by H19 expression level.

Table S1. Number of samples and genes across the 24 cancer types based on TCGA data.

Table S2. Eighty-eight H19-TF-gene regulation triplets identified in at least two cancer types.

Table S3. 173 of 186 (93%) TF-gene pairs had direct or indirect evidence to support their relation to cancer (Table S3). The remaining 13 TF-gene pairs might be potential candidates for cancer research.

Table S4. The list of 29 H19 target miRNAs with evidence in literature.

Table S5. Regulation of 29 miRNAs in eight triplets. In the H19-ETS1-*TGFBR2* sheet, we list all the 29 miRNAs and their targets (TFs and genes). Some of the targets were predicted and then verified. In the H19-ETS1-*TGFBR2* table, TFs are marked in yellow if miRNAs target them, and genes are marked in red if miRNAs target them.

Table S6. Primers for qRT-PCR.

Figure S1. H19 highly expressed across pan-cancer except for brain lower grade glioma (LGG), prostate adenocarcinoma (PRAD), and thyroid carcinoma (THCA).

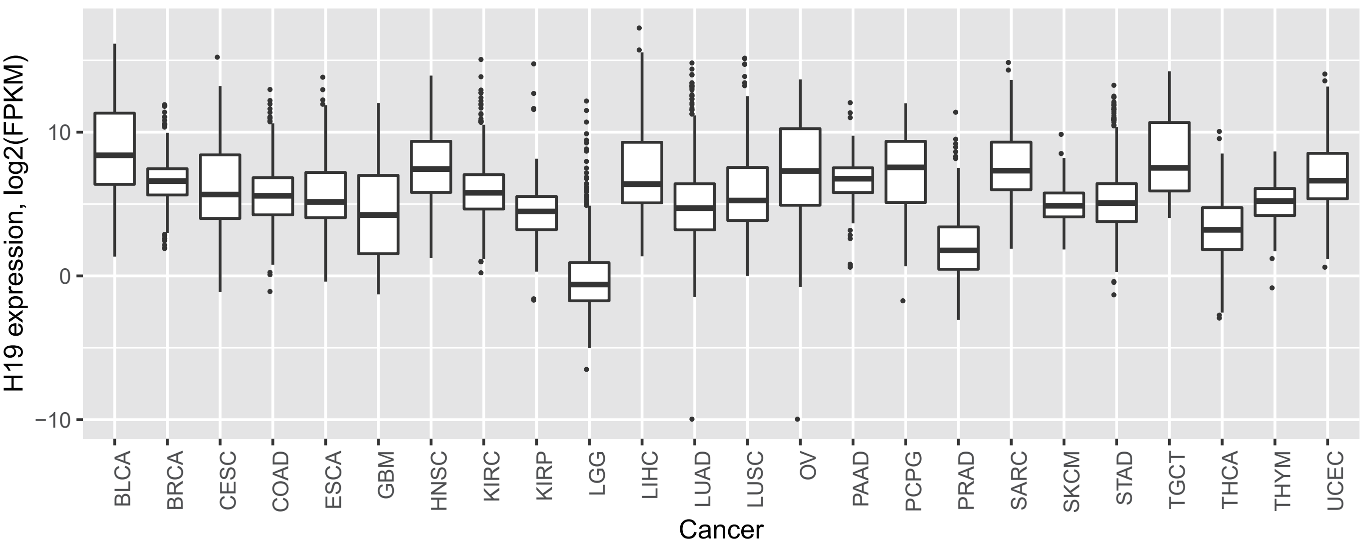
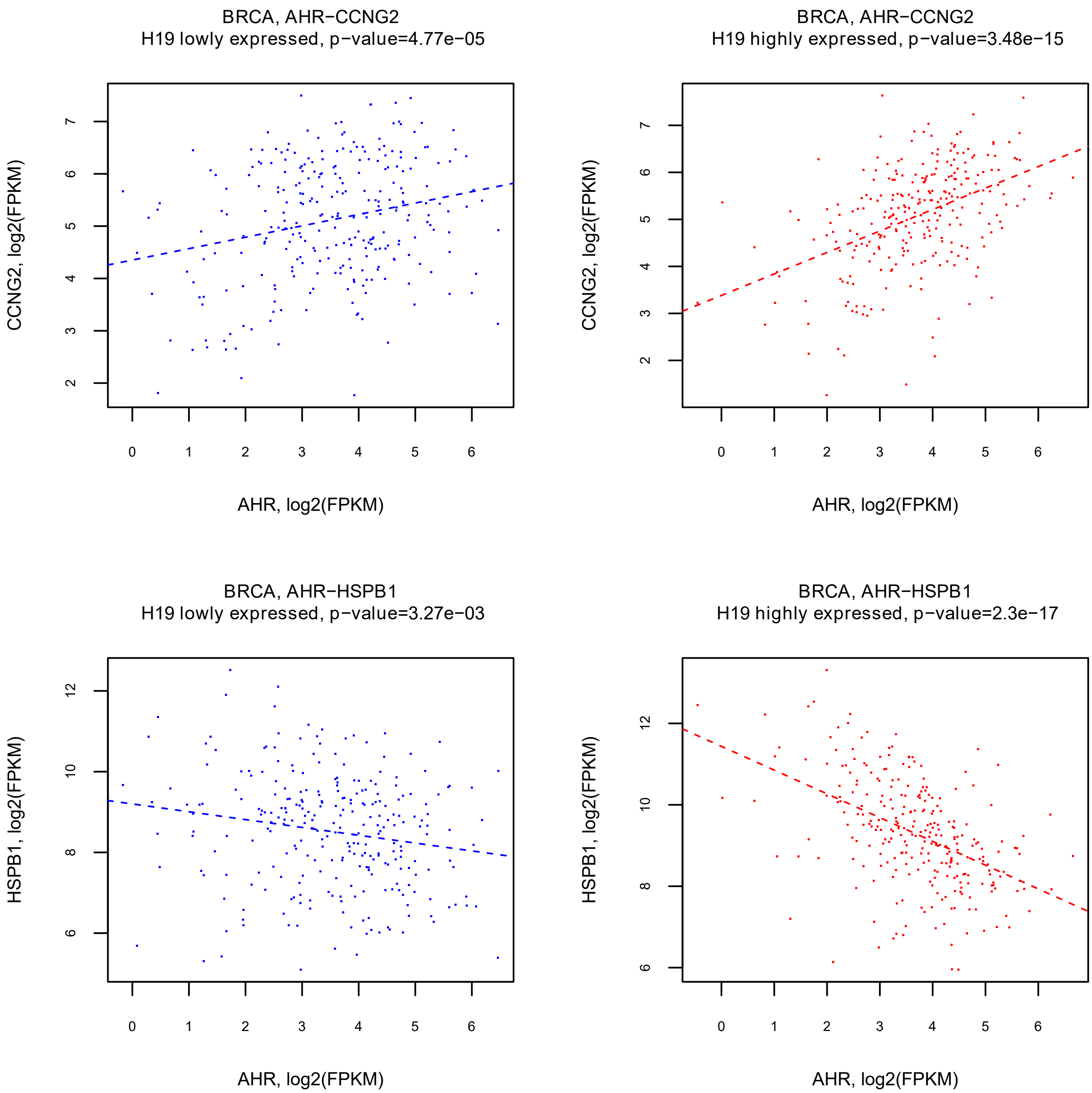
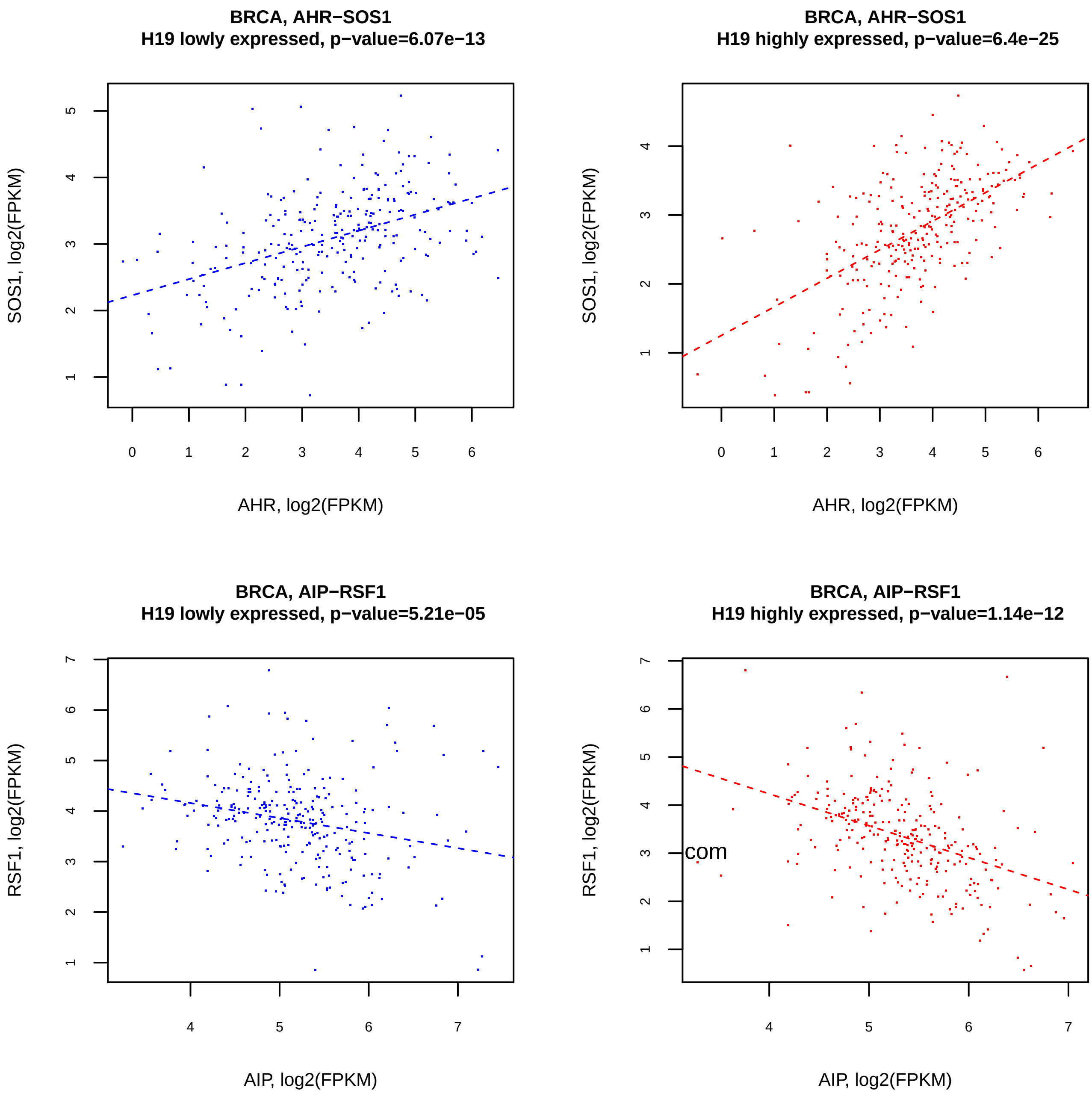


Figure S2. TF-gene regulation was affected by H19 expression level.




BRCA, AHR−SOS1
H19 lowly expressed, p−value=6.07e−13
SOS1, log2(FPKM)
AHR, log2(FPKM)
BRCA, AHR−SOS1
H19 highly expressed, p−value=6.4e−25
SOS1, log2(FPKM)
AHR, log2(FPKM)
BRCA, AIP−RSF1
H19 lowly expressed, p−value=5.21e−05
RSF1, log2(FPKM)
AIP, log2(FPKM)
BRCA, AIP−RSF1
H19 highly expressed, p−value=1.14e−12
RSF1, log2(FPKM)
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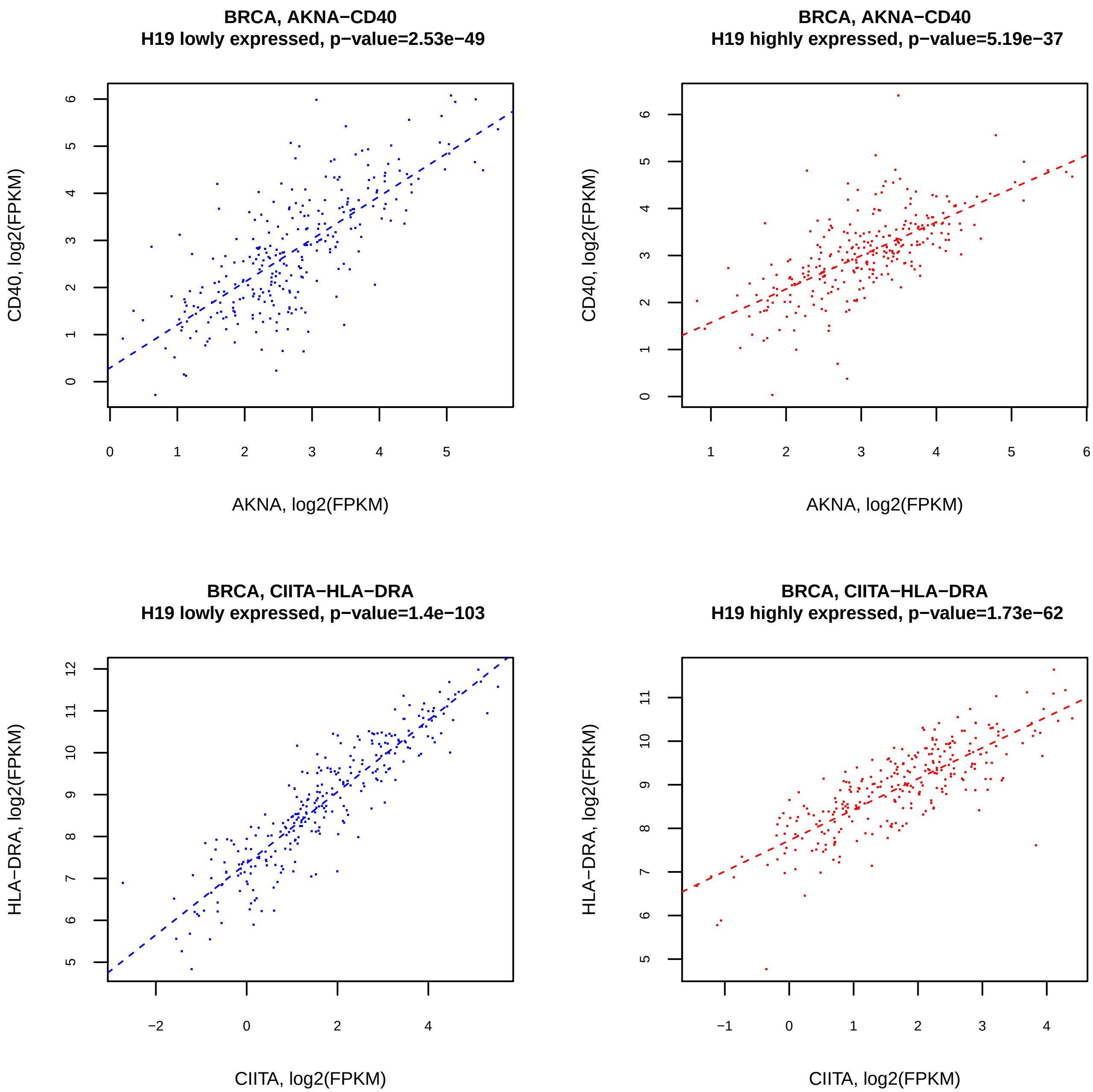
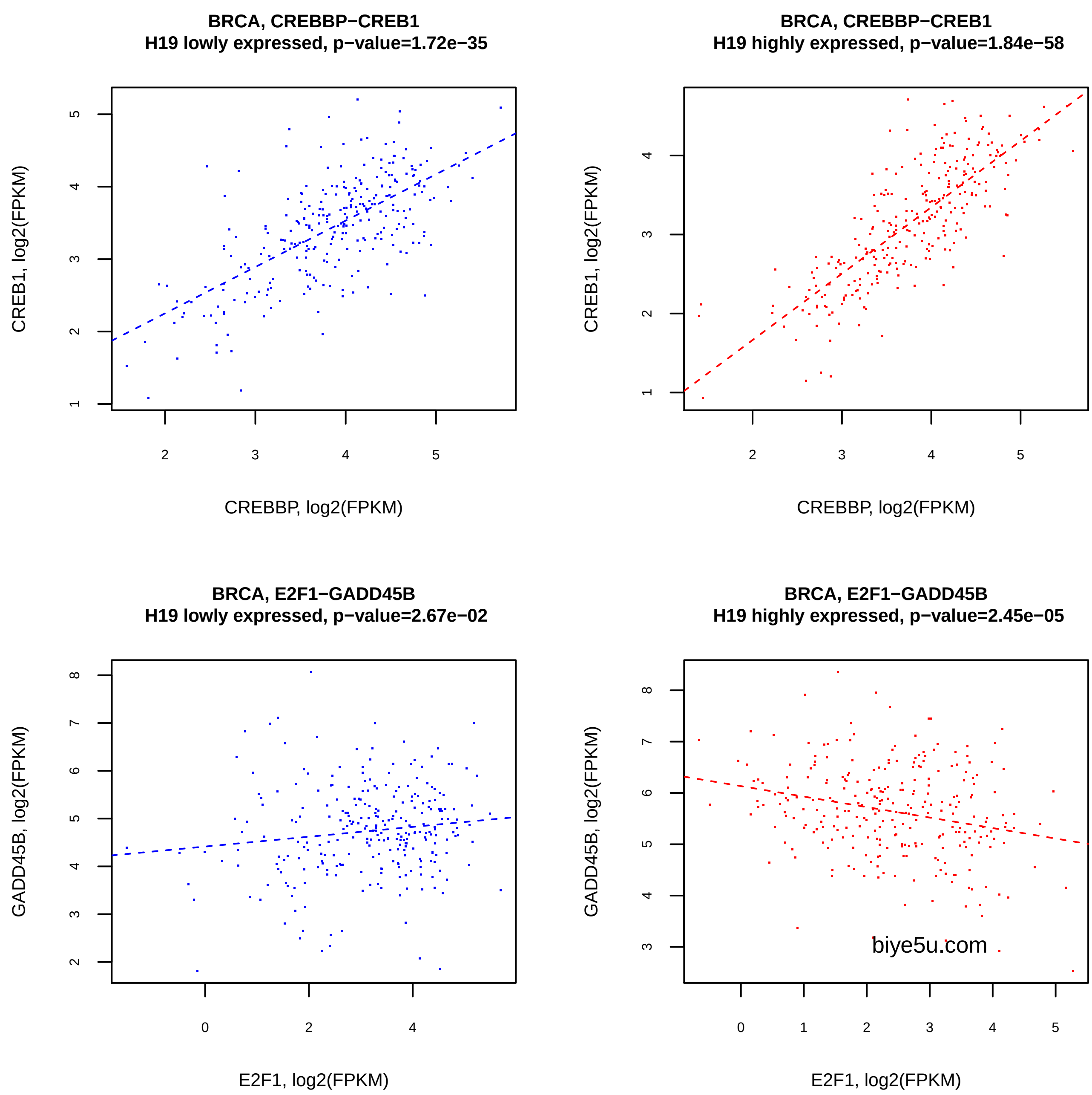
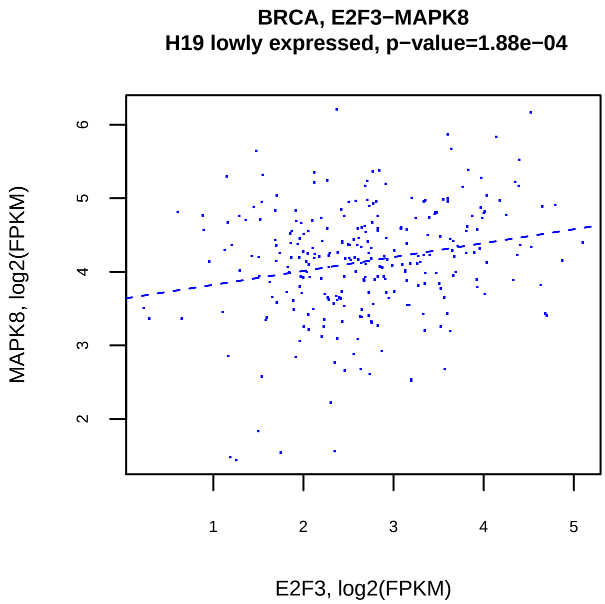
AIP, log2(FPKM)


BRCA, AKNA−CD40
H19 lowly expressed, p−value=2.53e−49
CD40, log2(FPKM)
AKNA, log2(FPKM)
BRCA, AKNA−CD40
H19 highly expressed, p−value=5.19e−37
CD40, log2(FPKM)
AKNA, log2(FPKM)
BRCA, CIITA−HLA−DRA
H19 lowly expressed, p−value=1.4e−103
HLA−DRA, log2(FPKM)
CIITA, log2(FPKM)
BRCA, CIITA−HLA−DRA
H19 highly expressed, p−value=1.73e−62
HLA−DRA, log2(FPKM)
CIITA, log2(FPKM)


BRCA, CREBBP−CREB1
H19 lowly expressed, p−value=1.72e−35
CREB1, log2(FPKM)
CREBBP, log2(FPKM)
BRCA, CREBBP−CREB1
H19 highly expressed, p−value=1.84e−58
CREB1, log2(FPKM)
CREBBP, log2(FPKM)
BRCA, E2F1−GADD45B
H19 lowly expressed, p−value=2.67e−02
GADD45B, log2(FPKM)
E2F1, log2(FPKM)
BRCA, E2F1−GADD45B
H19 highly expressed, p−value=2.45e−05
GADD45B, log2(FPKM)
E2F1, log2(FPKM)


BRCA, E2F3−MAPK8
H19 lowly expressed, p−value=1.88e−04
MAPK8, log2(FPKM)
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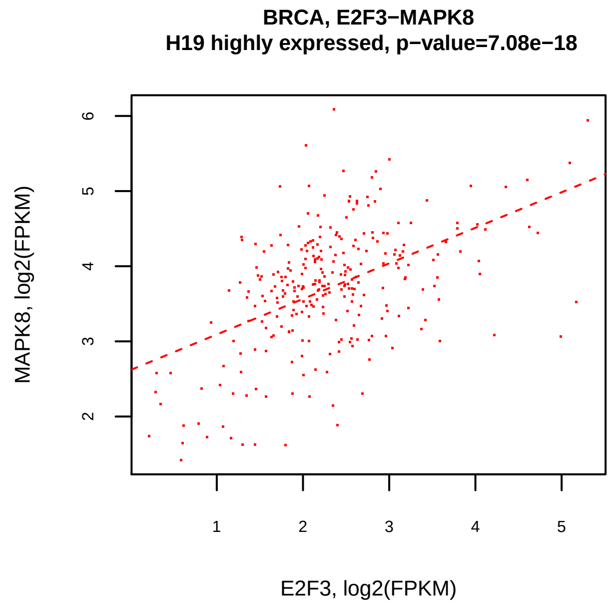
3
4
5
6
1
2
3
4
5
E2F3, log2(FPKM)


BRCA, E2F3−MAPK8
H19 highly expressed, p−value=7.08e−18
MAPK8, log2(FPKM)
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3
4
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6
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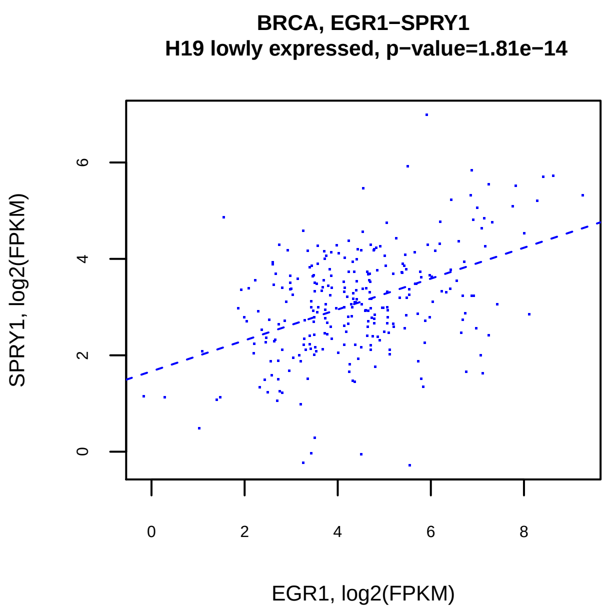
2
3
4
5
E2F3, log2(FPKM)


BRCA, EGR1−SPRY1
H19 lowly expressed, p−value=1.81e−14
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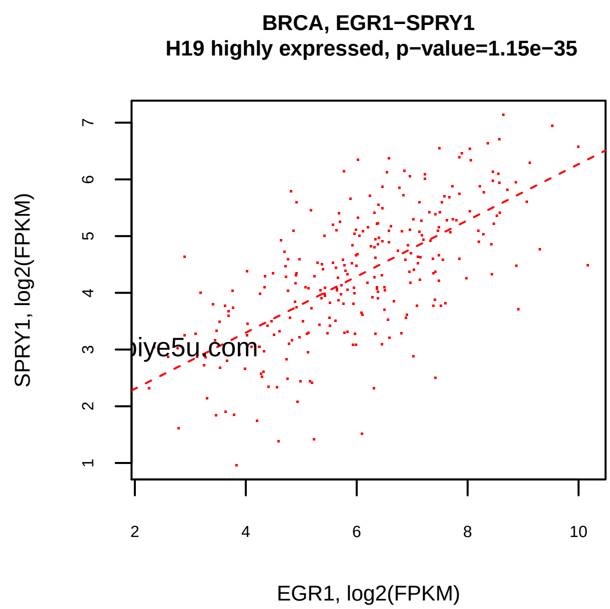
2
4
6
0
2
4
6
8
EGR1, log2(FPKM)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SPRY1, log2(FPKM)
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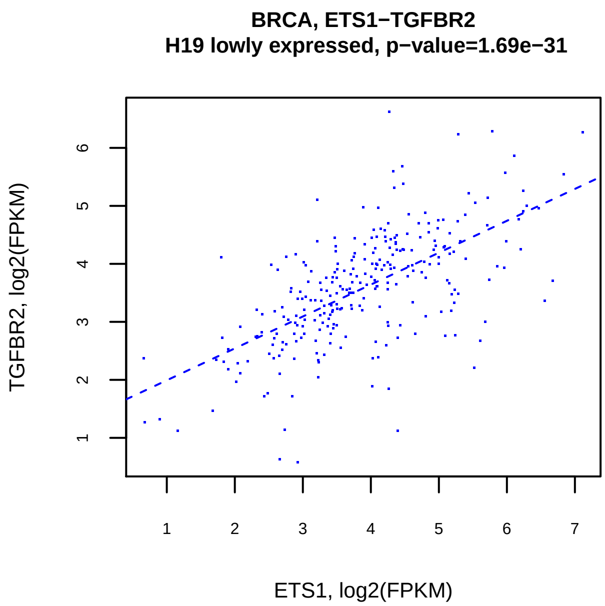
2
3
4
5
6
7
2
4
6
8
10
EGR1, log2(FPKM)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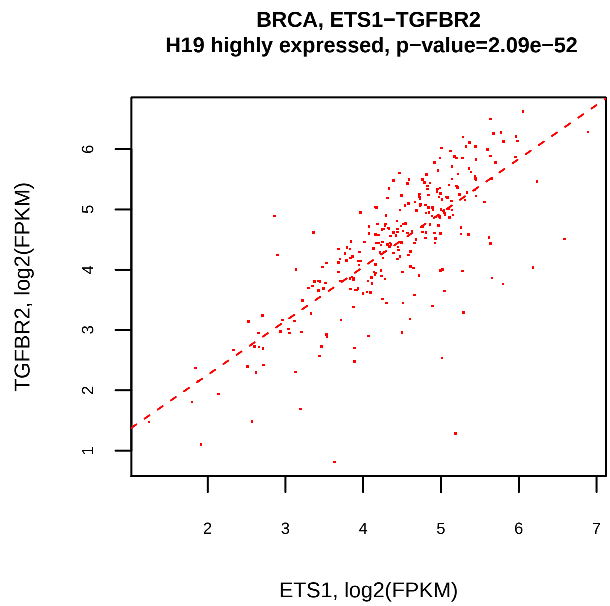
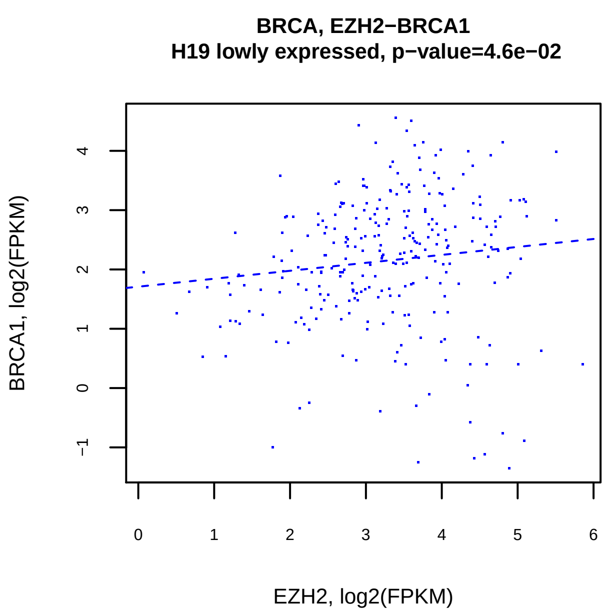
H19 lowly expressed, p−value=1.69e−31
TGFBR2, log2(FPKM)
ETS1, log2(FPKM)


BRCA, ETS1−TGFBR2
H19 highly expressed, p−value=2.09e−52
TGFBR2, log2(FPKM)
ETS1, log2(FPKM)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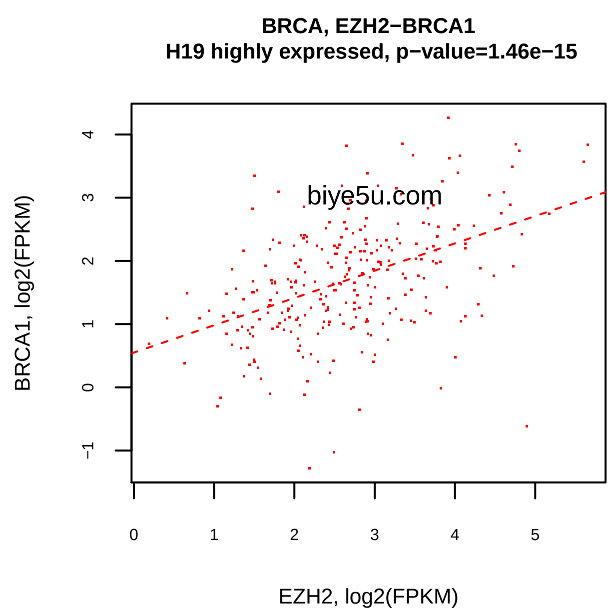
H19 lowly expressed, p−value=4.6e−02
BRCA1, log2(FPKM)
EZH2, log2(FPKM)


BRCA, EZH2−BRCA1
H19 highly expressed, p−value=1.46e−15
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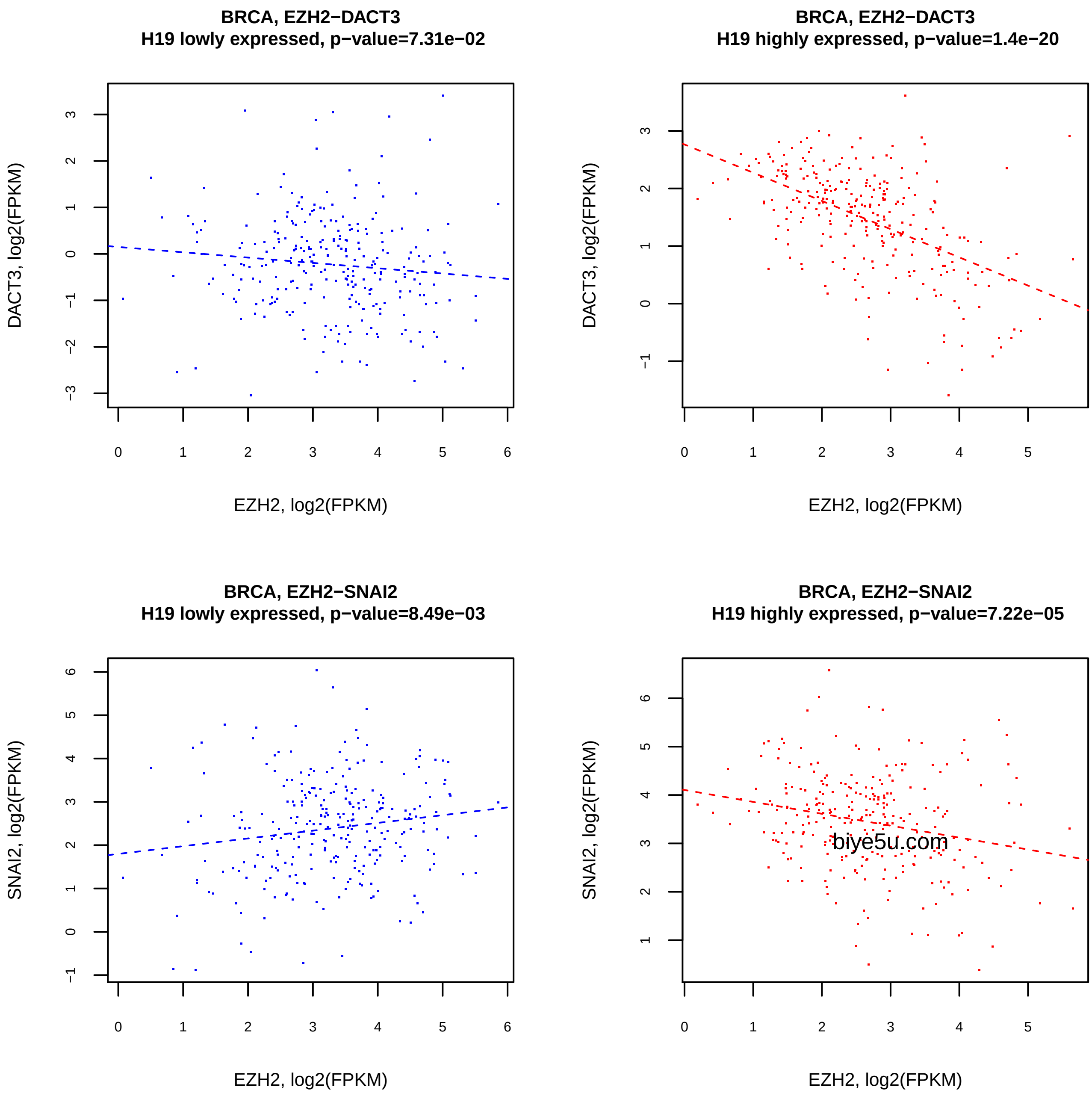
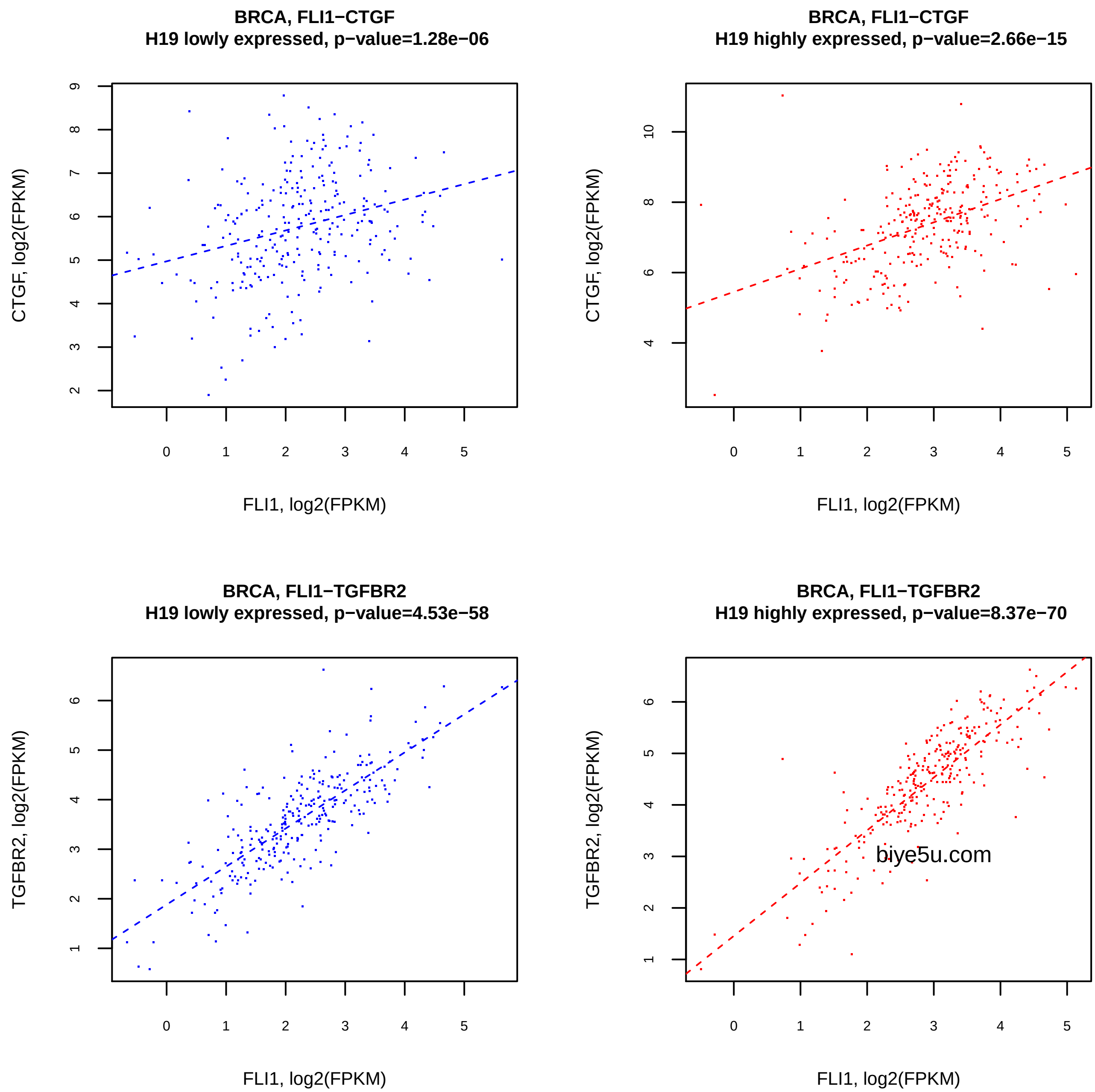
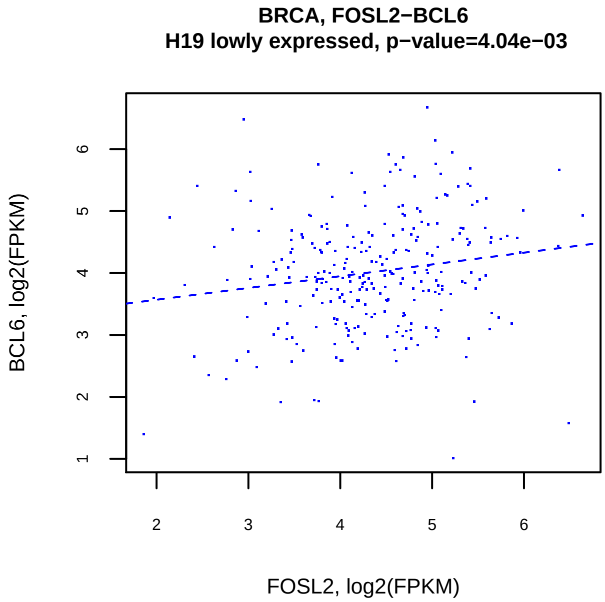
BRCA1, log2(FPKM)
EZH2, log2(FPKM)


BRCA, EZH2−DACT3
H19 lowly expressed, p−value=7.31e−02
DACT3, log2(FPKM)
EZH2, log2(FPKM)
BRCA, EZH2−DACT3
H19 highly expressed, p−value=1.4e−20
DACT3, log2(FPKM)
EZH2, log2(FPKM)
BRCA, EZH2−SNAI2
H19 lowly expressed, p−value=8.49e−03
SNAI2, log2(FPKM)
EZH2, log2(FPKM)
BRCA, EZH2−SNAI2
H19 highly expressed, p−value=7.22e−05
SNAI2, log2(FPKM)
EZH2, log2(FPKM)


BRCA, FLI1−CTGF
H19 lowly expressed, p−value=1.28e−06
CTGF, log2(FPKM)
FLI1, log2(FPKM)
BRCA, FLI1−CTGF
H19 highly expressed, p−value=2.66e−15
CTGF, log2(FPKM)
FLI1, log2(FPKM)
BRCA, FLI1−TGFBR2
H19 lowly expressed, p−value=4.53e−58
TGFBR2, log2(FPKM)
FLI1, log2(FPKM)
BRCA, FLI1−TGFBR2
H19 highly expressed, p−value=8.37e−70
TGFBR2, log2(FPKM)
FLI1, log2(FPKM)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BCL6, log2(FPKM)
FOSL2, log2(FPKM)
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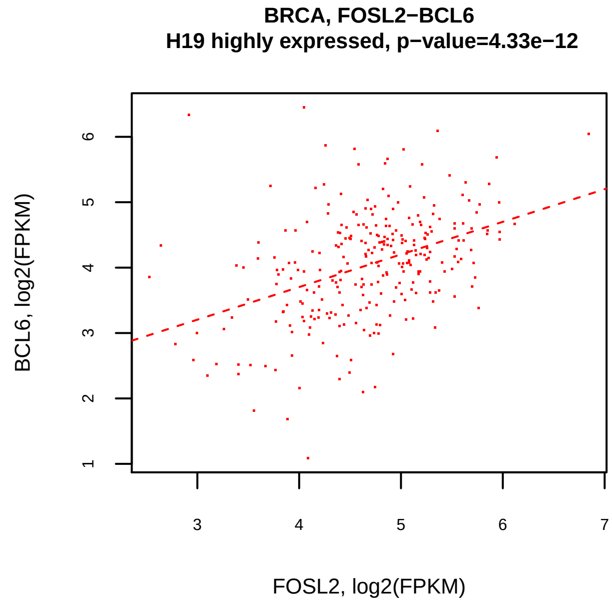
2 3 4 5 6


BRCA, FOSL2−BCL6
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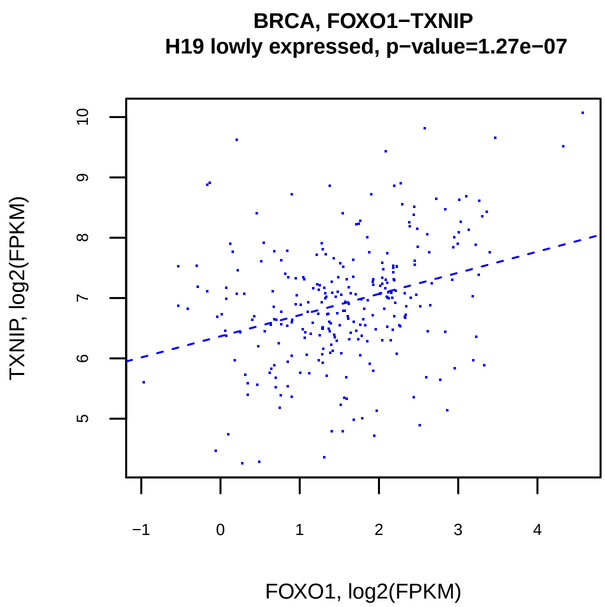
BCL6, log2(FPKM)
FOSL2, log2(FPKM)
1 2 3 4 5 6
3 4 5 6 7


BRCA, FOXO1−TXNIP
H19 lowly expressed, p−value=1.27e−07
TXNIP, log2(FPKM)
FOXO1, log2(FPKM)
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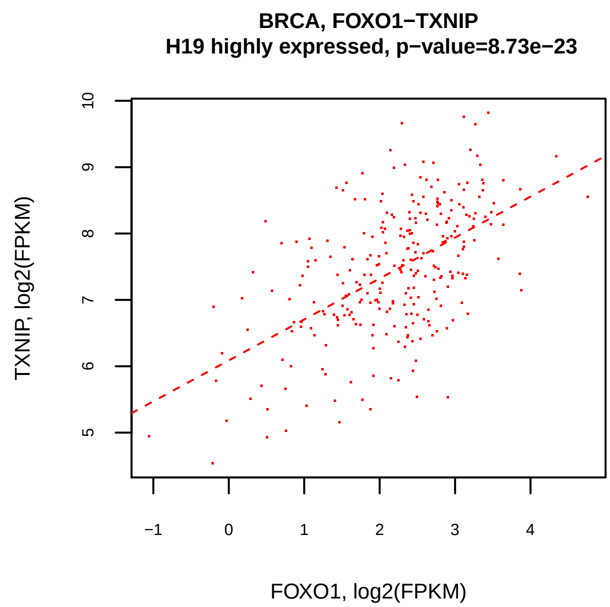
−1 0 1 2 3 4


BRCA, FOXO1−TXNIP
H19 highly expressed, p−value=8.73e−23
TXNIP, log2(FPKM)
FOXO1, log2(FPKM)
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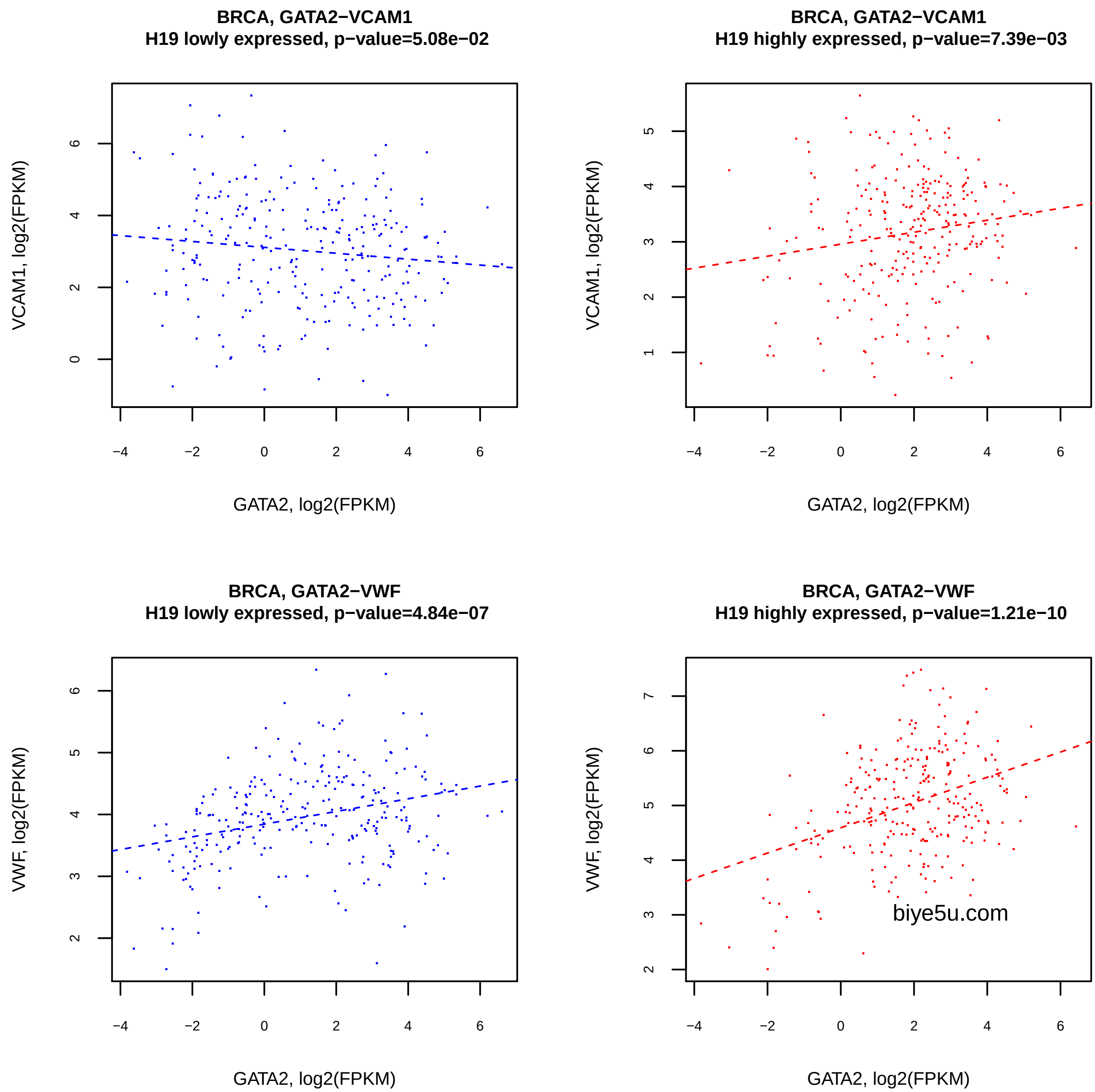
−1 0 1 2 3 4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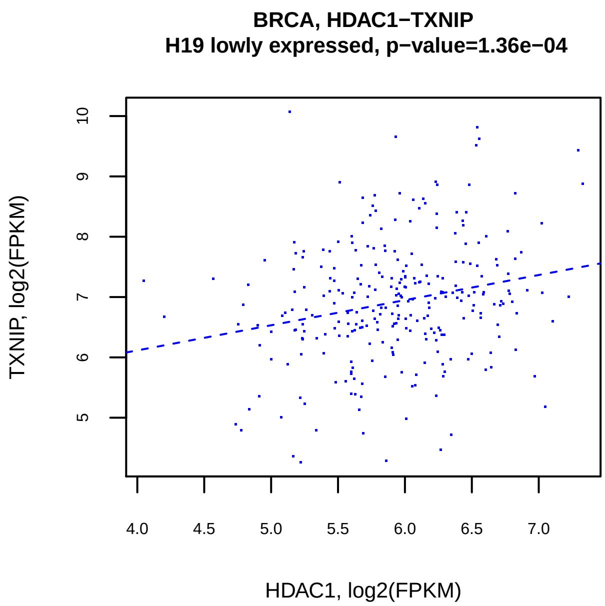
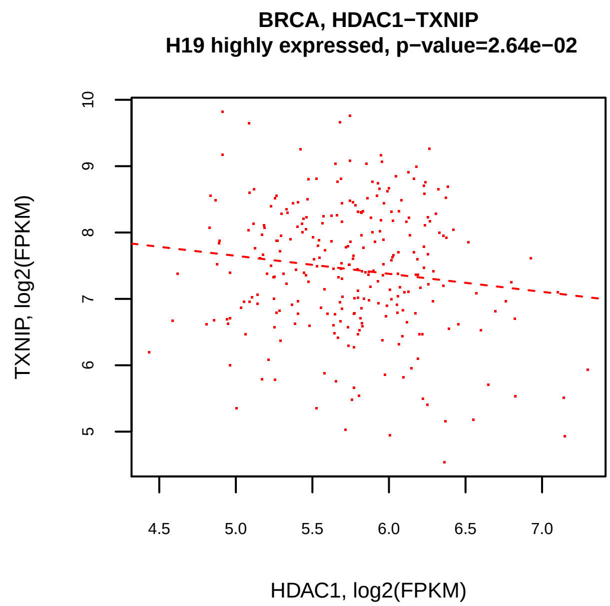
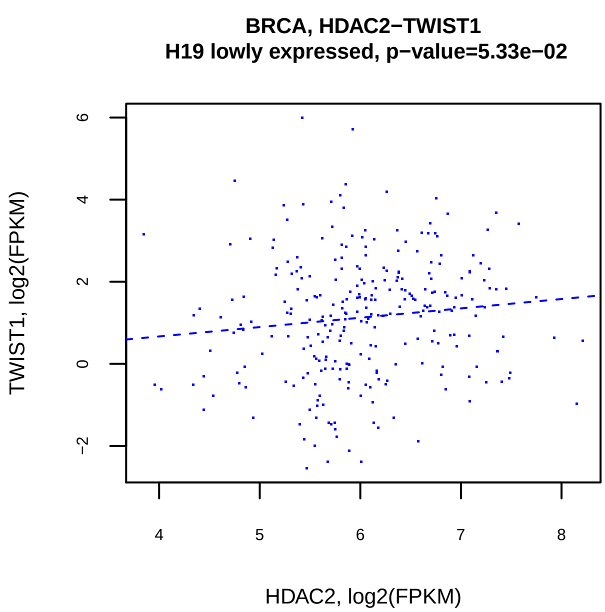
H19 lowly expressed, p−value=5.08e−02
VCAM1, log2(FPKM)
GATA2, log2(FPKM)
BRCA, GATA2−VCAM1
H19 highly expressed, p−value=7.39e−03
VCAM1, log2(FPKM)
GATA2, log2(FPKM)
BRCA, GATA2−VWF
H19 lowly expressed, p−value=4.84e−07
VWF, log2(FPKM)
GATA2, log2(FPKM)
BRCA, GATA2−VWF
H19 highly expressed, p−value=1.21e−10
VWF, log2(FPKM)
GATA2, log2(FPKM)


BRCA, HDAC1−TXNIP
H19 lowly expressed, p−value=1.36e−04
TXNIP, log2(FPKM)
HDAC1, log2(FPKM)


BRCA, HDAC1−TXNIP
H19 highly expressed, p−value=2.64e−02
TXNIP, log2(FPKM)
HDAC1, log2(FPKM)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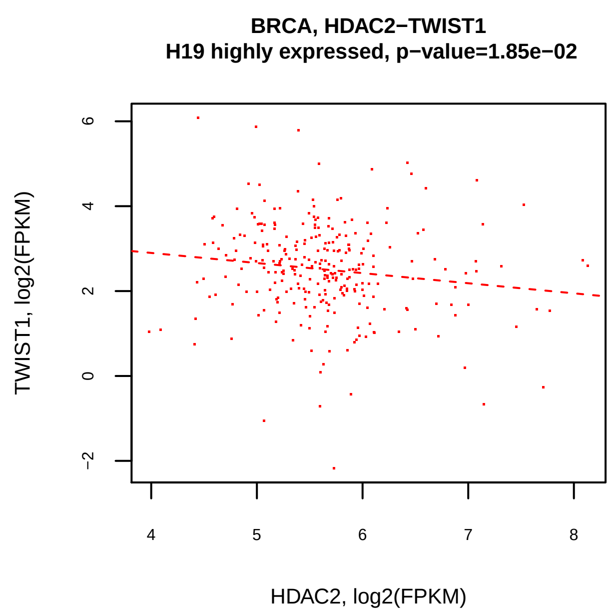
TWIST1, log2(FPKM)
HDAC2, log2(FPKM)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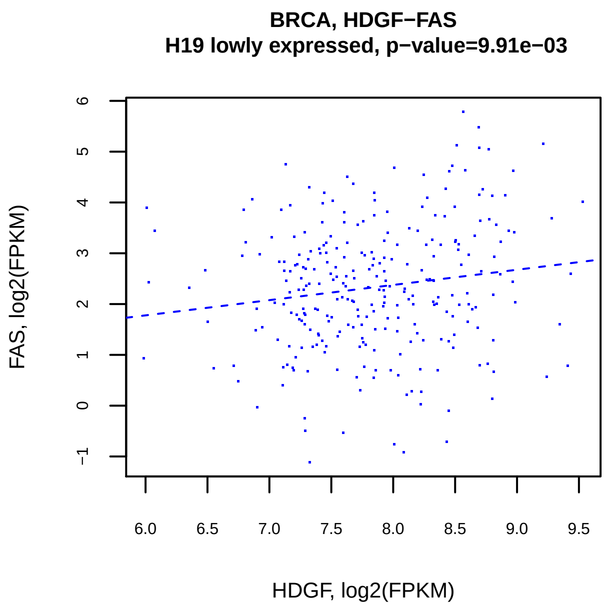
TWIST1, log2(FPKM)
HDAC2, log2(FPKM)



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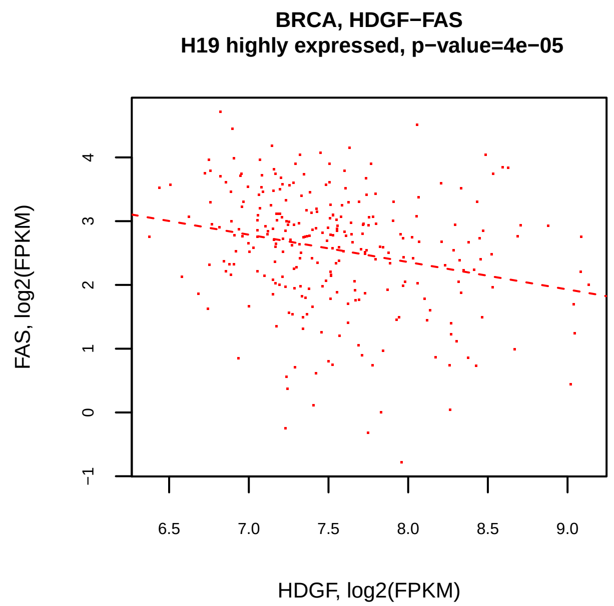
H19 lowly expressed, p−value=9.91e−03
FAS, log2(FPKM)
HDGF, log2(FPKM)
6.0
6.5
7.0
7.5
8.0
8.5
9.0
9.5
−1
0
1
2
3
4
5
6



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H19 highly expressed, p−value=4e−05
FAS, log2(FPKM)
HDGF, log2(FPKM)
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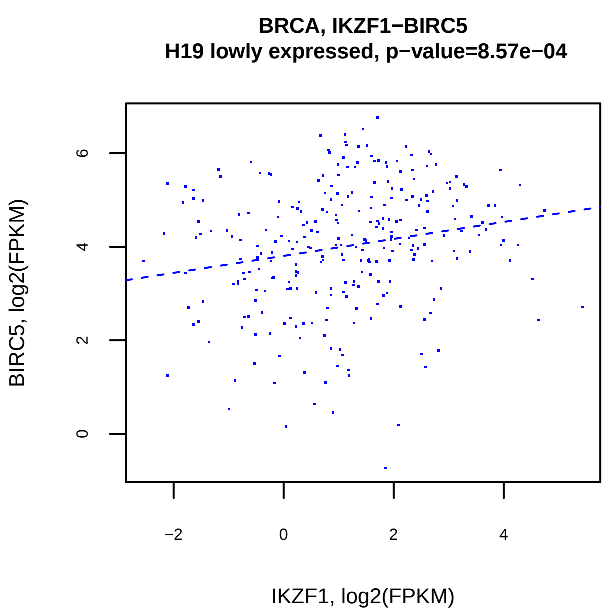
0
1
2
3
4



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IKZF1, log2(FPKM)
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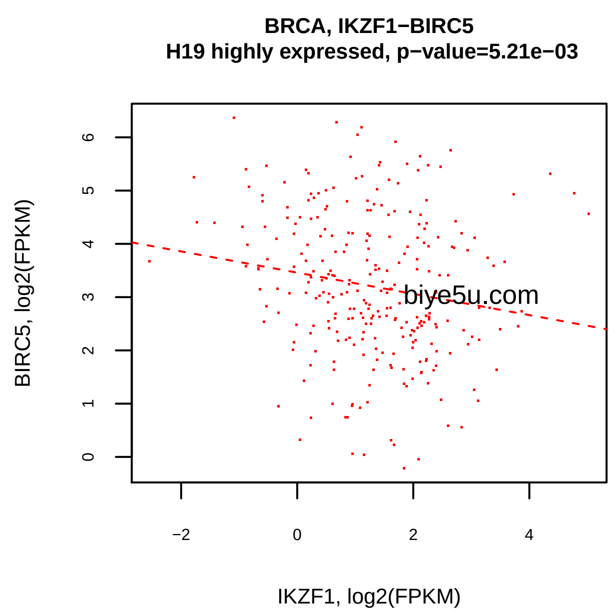
4
0
2
4
6



BRCA, IKZF1−BIRC5
H19 highly expressed, p−value=5.21e−03
BIRC5, log2(FPKM)
IKZF1, log2(FPKM)
−2
0
2
4
0
1
2
3
4
5
6
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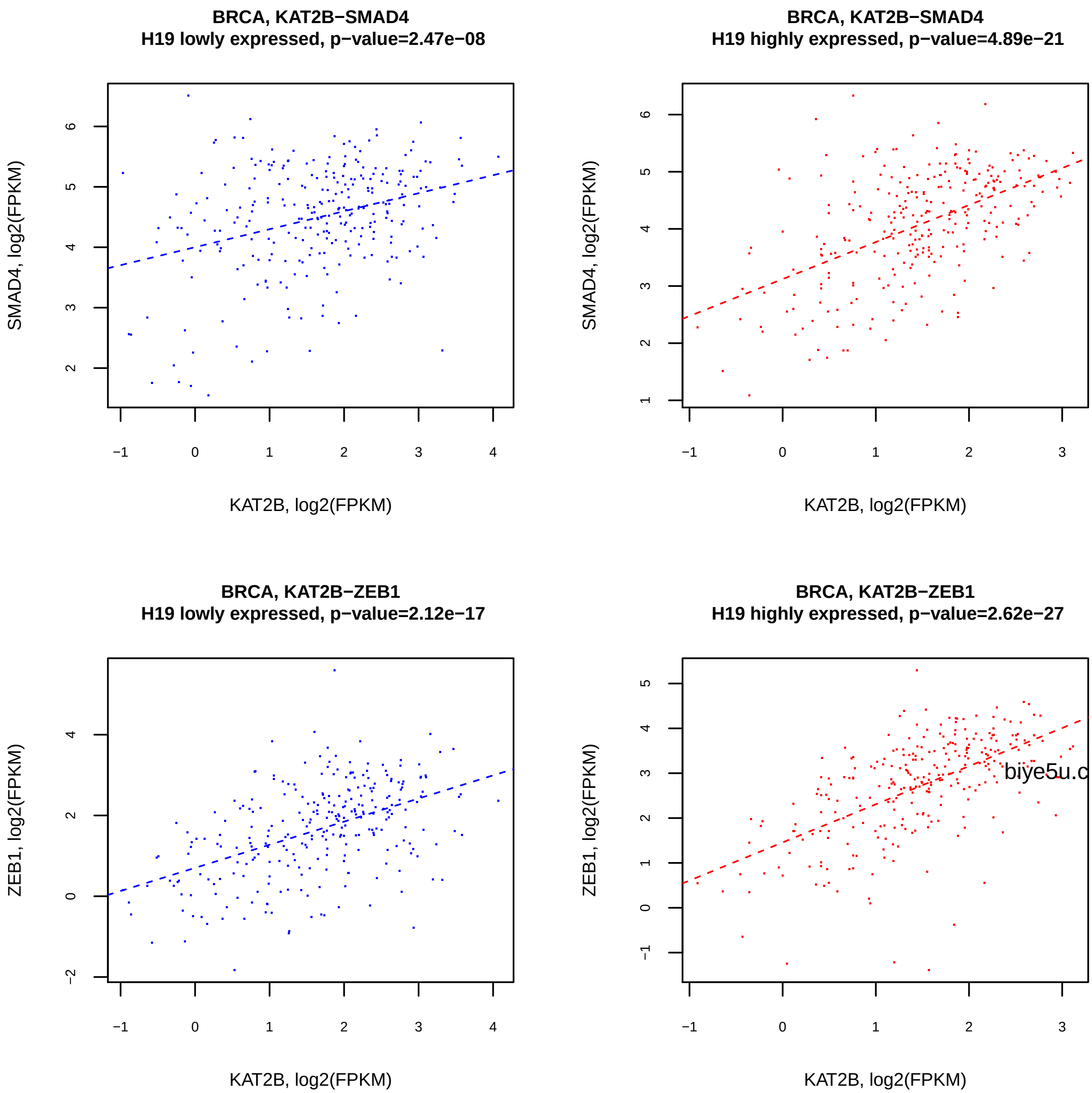
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SMAD4, log2(FPKM)
KAT2B, log2(FPKM)
BRCA, KAT2B−SMAD4
H19 highly expressed, p−value=4.89e−21
SMAD4, log2(FPKM)
KAT2B, log2(FPKM)
BRCA, KAT2B−ZEB1
H19 lowly expressed, p−value=2.12e−17
ZEB1, log2(FPKM)
KAT2B, log2(FPKM)
BRCA, KAT2B−ZEB1
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ZEB1, log2(FPKM)
KAT2B, log2(FPKM)
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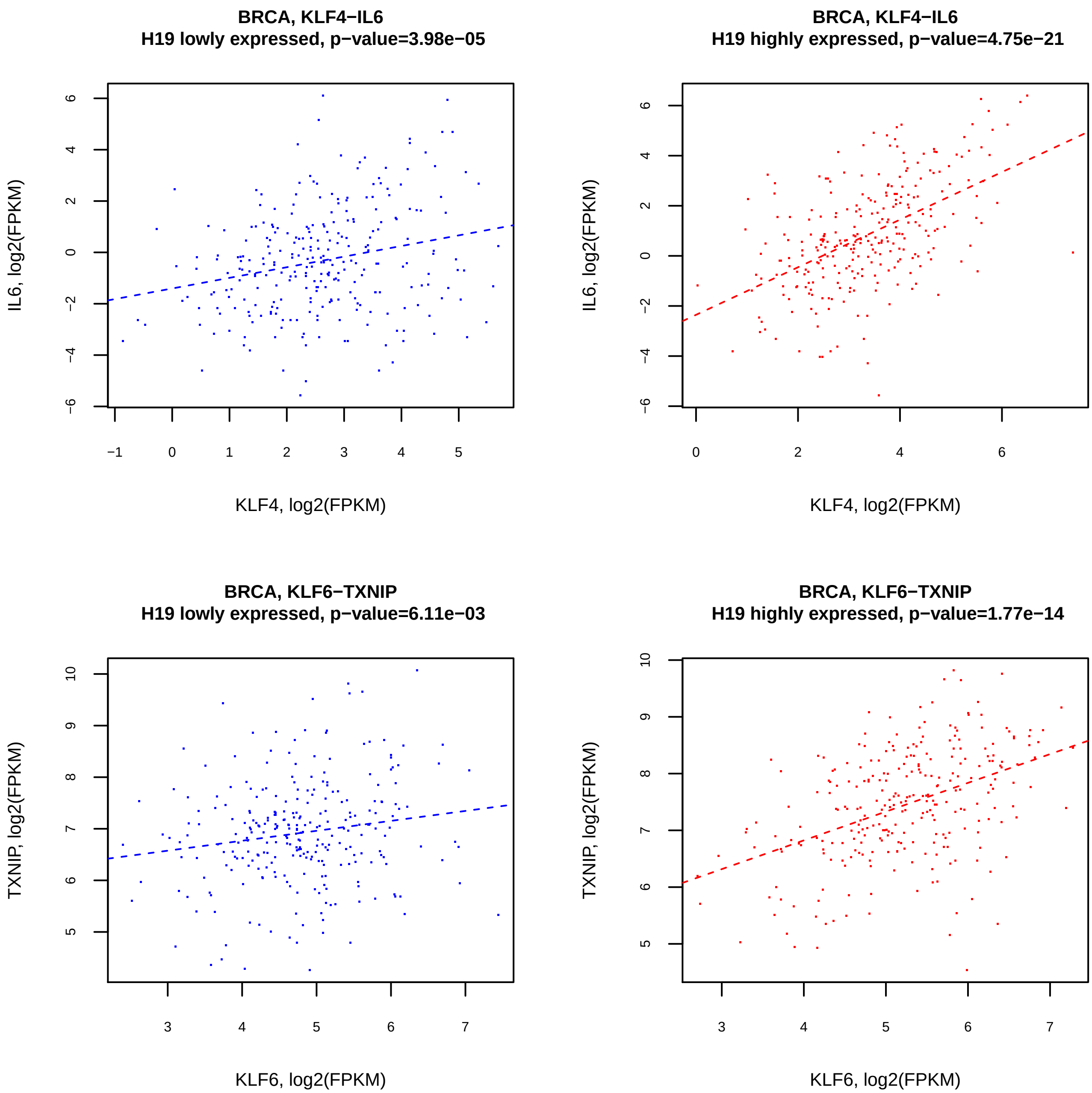
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IL6, log2(FPKM)
KLF4, log2(FPKM)
BRCA, KLF4−IL6
H19 highly expressed, p−value=4.75e−21
IL6, log2(FPKM)
KLF4, log2(FPKM)
BRCA, KLF6−TXNIP
H19 lowly expressed, p−value=6.11e−03
TXNIP, log2(FPKM)
KLF6, log2(FPKM)
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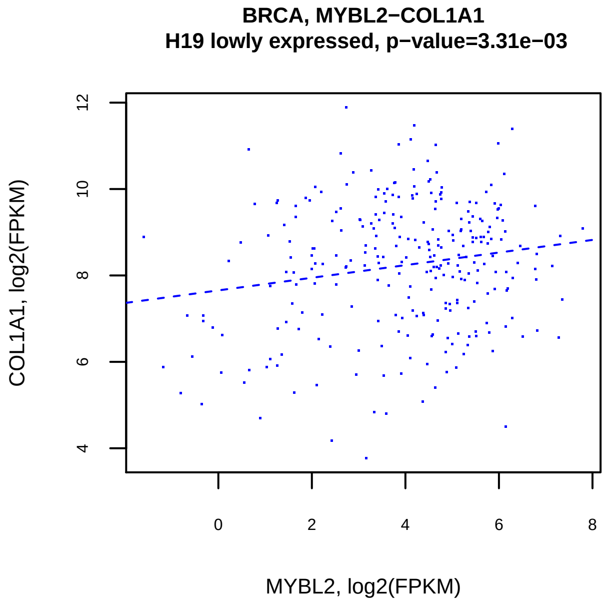
KLF6, log2(FPKM)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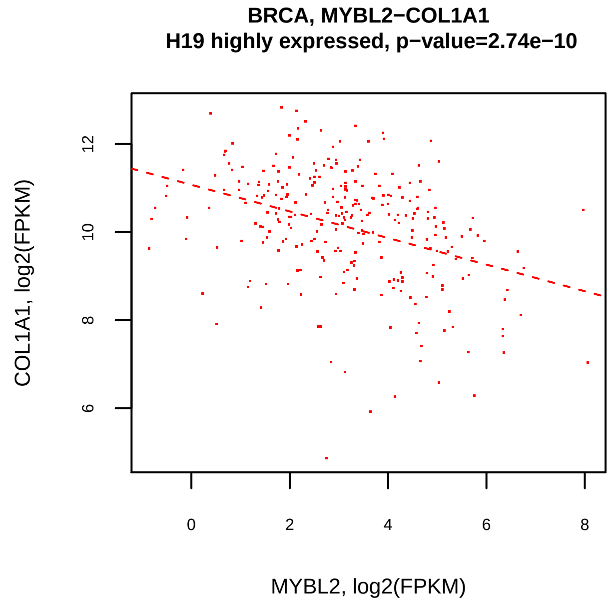
COL1A1, log2(FPKM)
MYBL2, log2(FPKM)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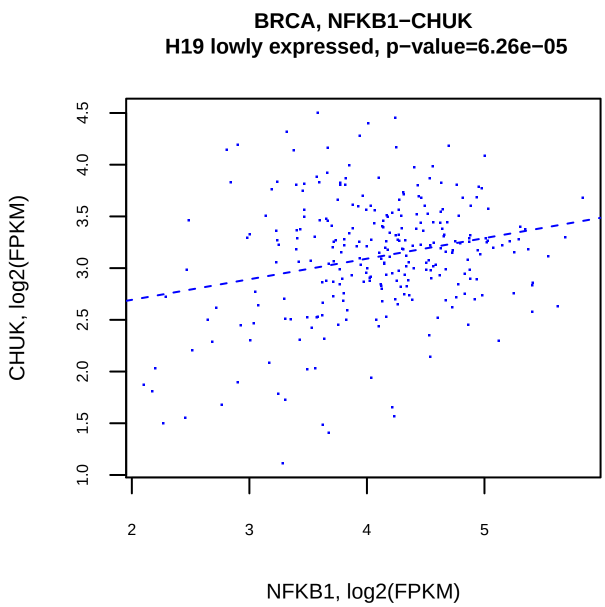
H19 highly expressed, p−value=2.74e−10
COL1A1, log2(FPKM)
MYBL2, log2(FPKM)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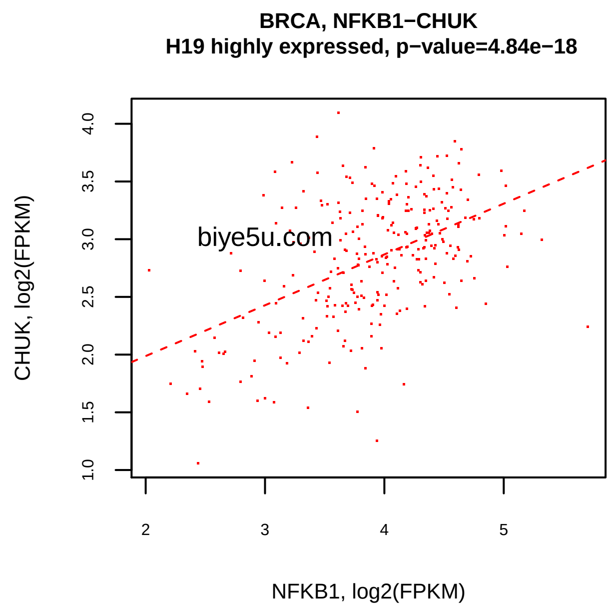
H19 lowly expressed, p−value=6.26e−05
CHUK, log2(FPKM)
NFKB1, log2(FPKM)


BRCA, NFKB1−CHUK
H19 highly expressed, p−value=4.84e−18
CHUK, log2(FPKM)
NFKB1, log2(FPKM)
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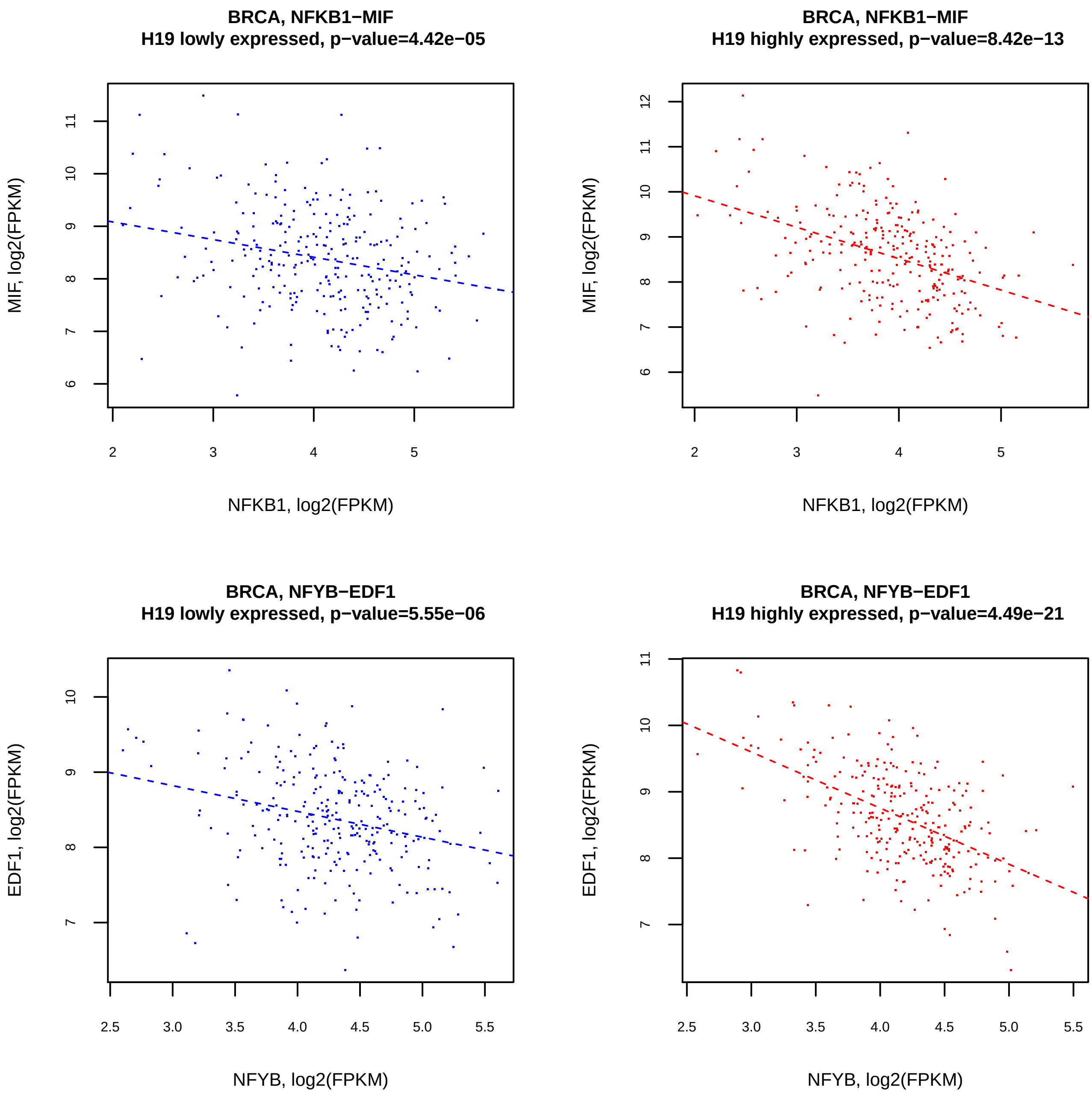
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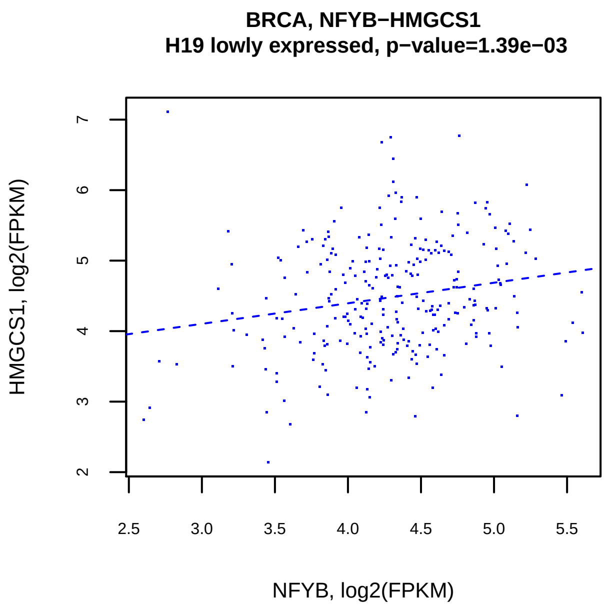
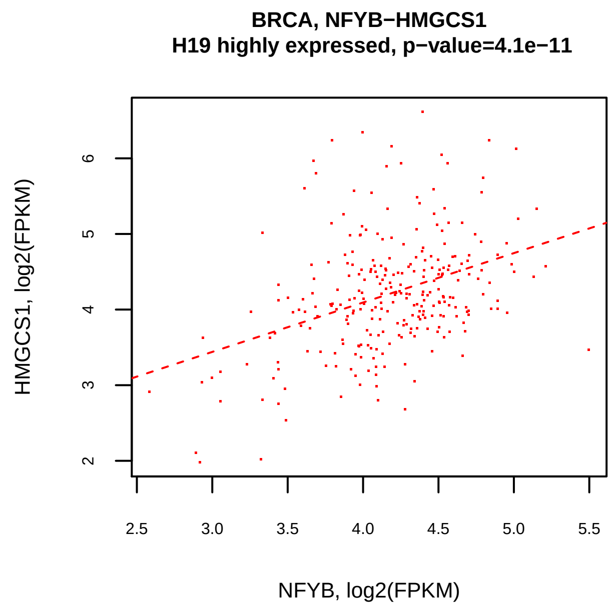
MIF, log2(FPKM)
NFKB1, log2(FPKM)
BRCA, NFKB1−MIF
H19 highly expressed, p−value=8.42e−13
MIF, log2(FPKM)
NFKB1, log2(FPKM)
BRCA, NFYB−EDF1
H19 lowly expressed, p−value=5.55e−06
EDF1, log2(FPKM)
NFYB, log2(FPKM)
BRCA, NFYB−EDF1
H19 highly expressed, p−value=4.49e−21
EDF1, log2(FPKM)
NFYB, log2(FPKM)


BRCA, NFYB−HMGCS1
H19 lowly expressed, p−value=1.39e−03
HMGCS1, log2(FPKM)
NFYB, log2(FPKM)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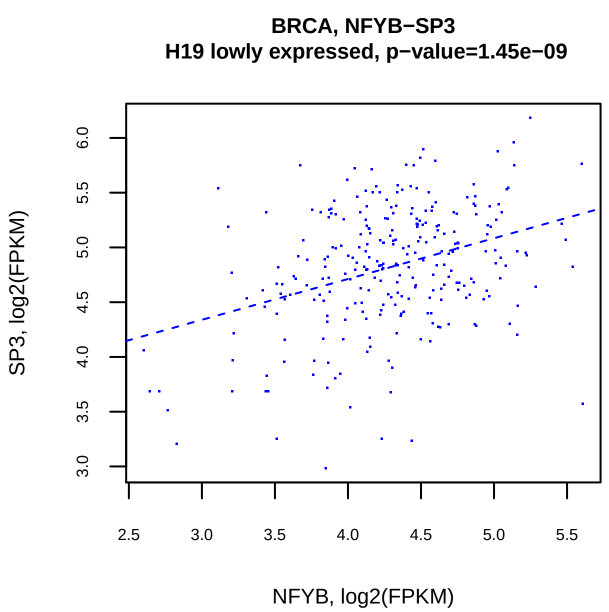
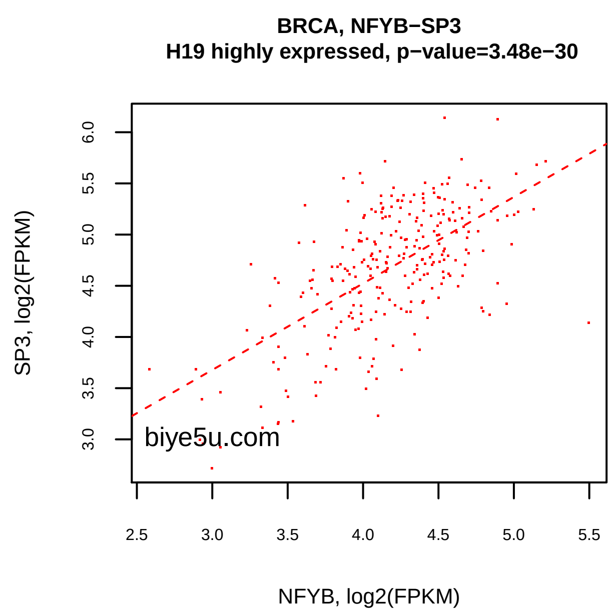
H19 highly expressed, p−value=4.1e−11
HMGCS1, log2(FPKM)
NFYB, log2(FPKM)


BRCA, NFYB−SP3
H19 lowly expressed, p−value=1.45e−09
SP3, log2(FPKM)
NFYB, log2(FPKM)


BRCA, NFYB−SP3
H19 highly expressed, p−value=3.48e−30
SP3, log2(FPKM)
NFYB, log2(FPKM)
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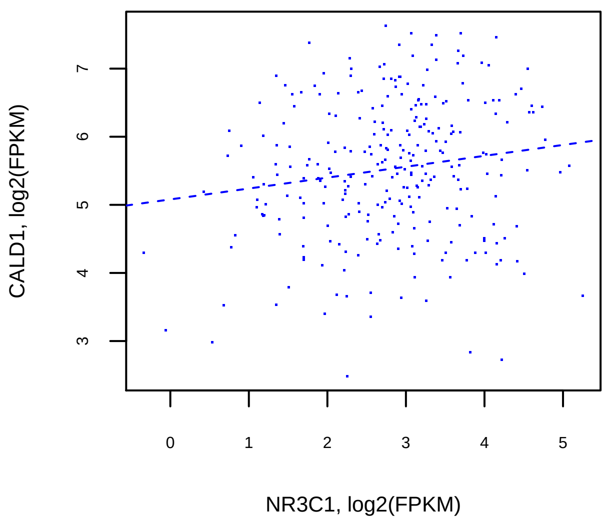
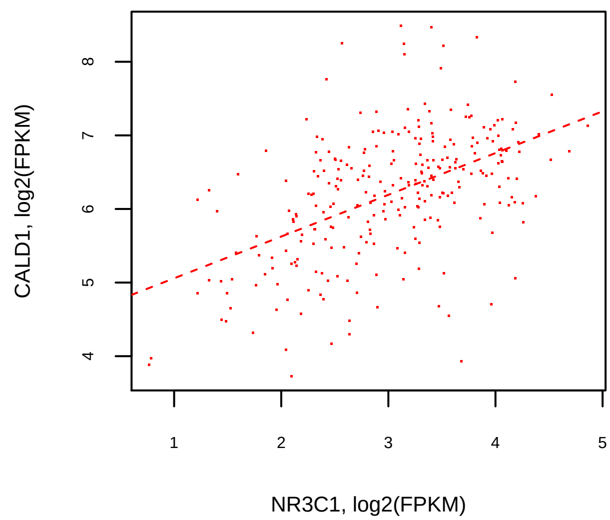
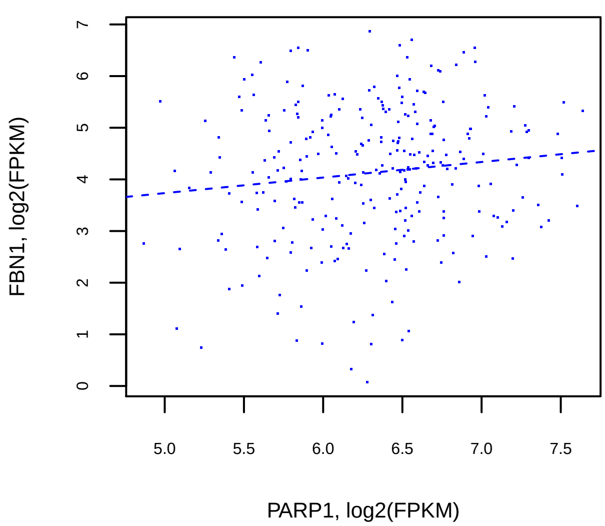
BRCA, NR3C1−CALD1
H19 lowly expressed, p−value=1.01e−02



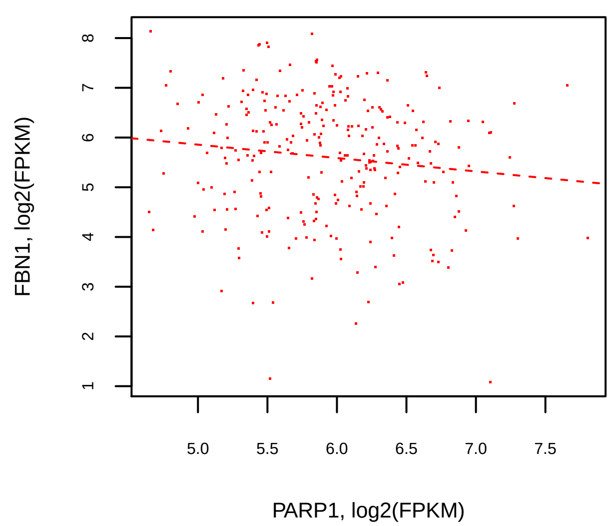
BRCA, NR3C1−CALD1
H19 highly expressed, p−value=4.54e−19

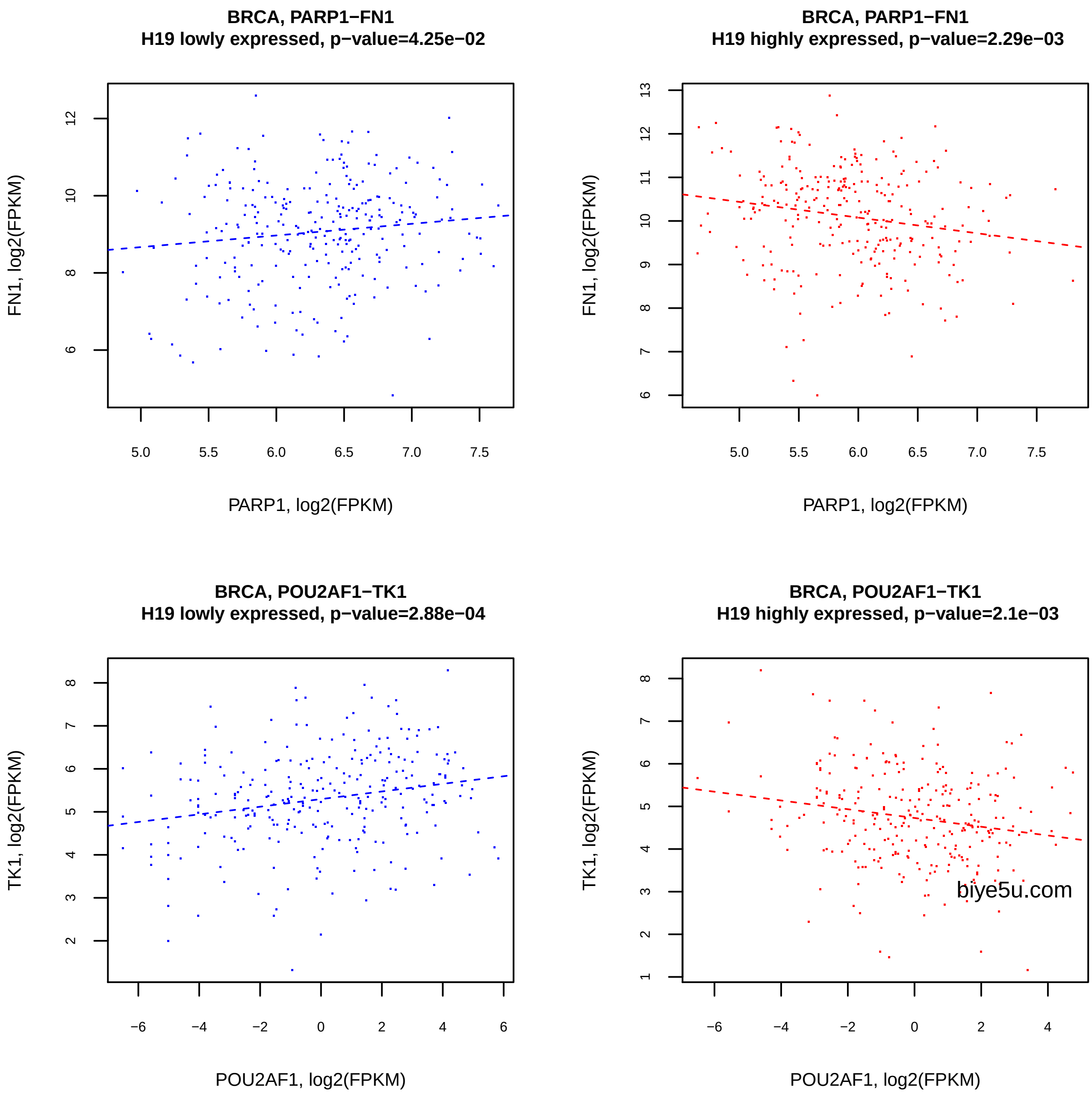


BRCA, PARP1−FBN1
H19 lowly expressed, p−value=3.92e−02



BRCA, PARP1−FBN1
H19 highly expressed, p−value=3.94e−02




BRCA, PARP1−FN1
H19 lowly expressed, p−value=4.25e−02
FN1, log2(FPKM)
6
8
10
12
5.0
5.5
6.0
6.5
7.0
7.5
PARP1, log2(FPKM)
BRCA, PARP1−FN1
H19 highly expressed, p−value=2.29e−03
FN1, log2(FPKM)
6
7
8
9
10
11
12
13
5.0
5.5
6.0
6.5
7.0
7.5
PARP1, log2(FPKM)
BRCA, POU2AF1−TK1
H19 lowly expressed, p−value=2.88e−04
TK1, log2(FPKM)
2
3
4
5
6
7
8
−6
−4
−2
0
2
4
6
POU2AF1, log2(FPKM)
BRCA, POU2AF1−TK1
H19 highly expressed, p−value=2.1e−03
TK1, log2(FPKM)
1
2
3
4
5
6
7
8
−6
−4
−2
0
2
4
POU2AF1, log2(FPKM)
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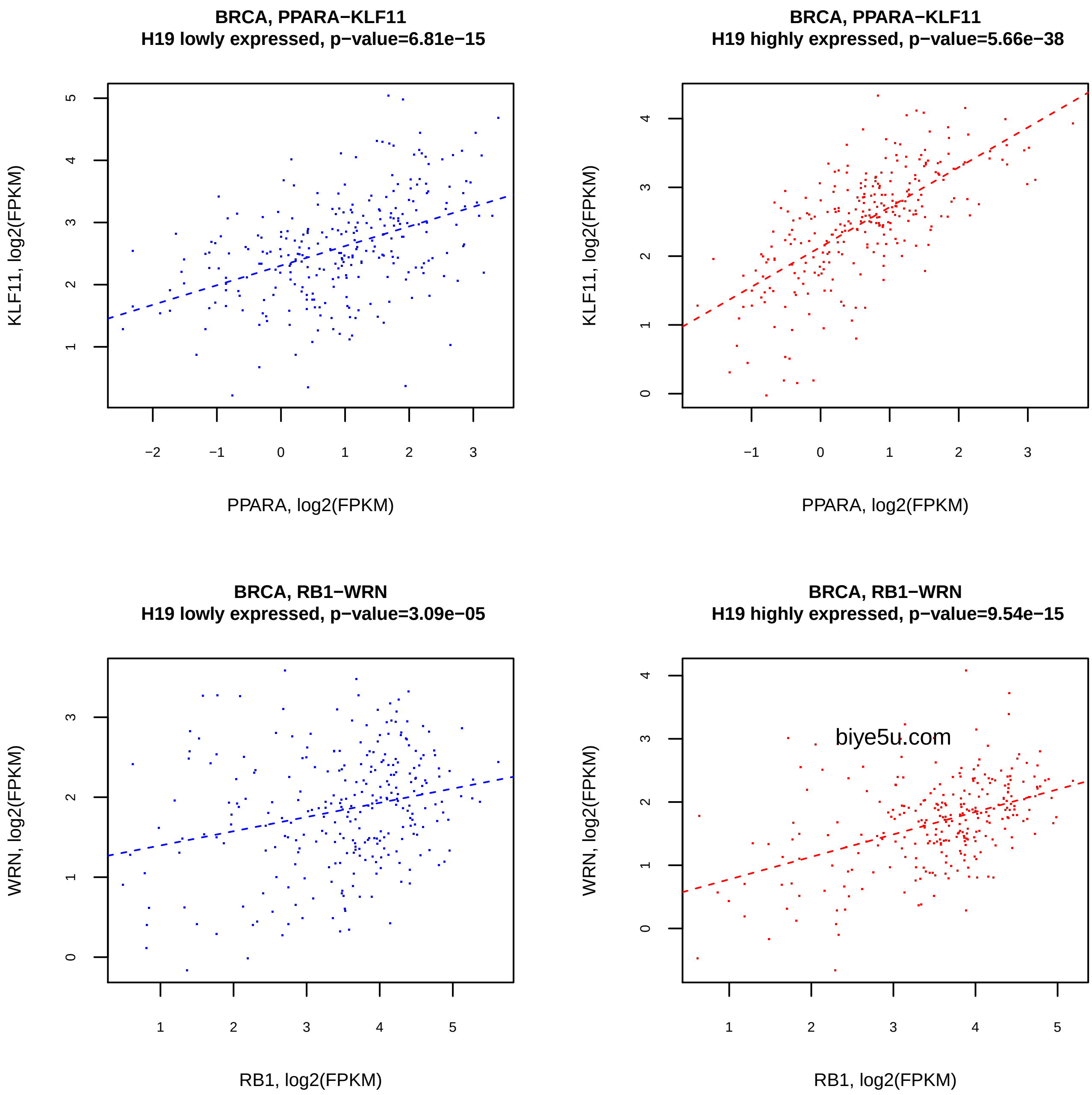
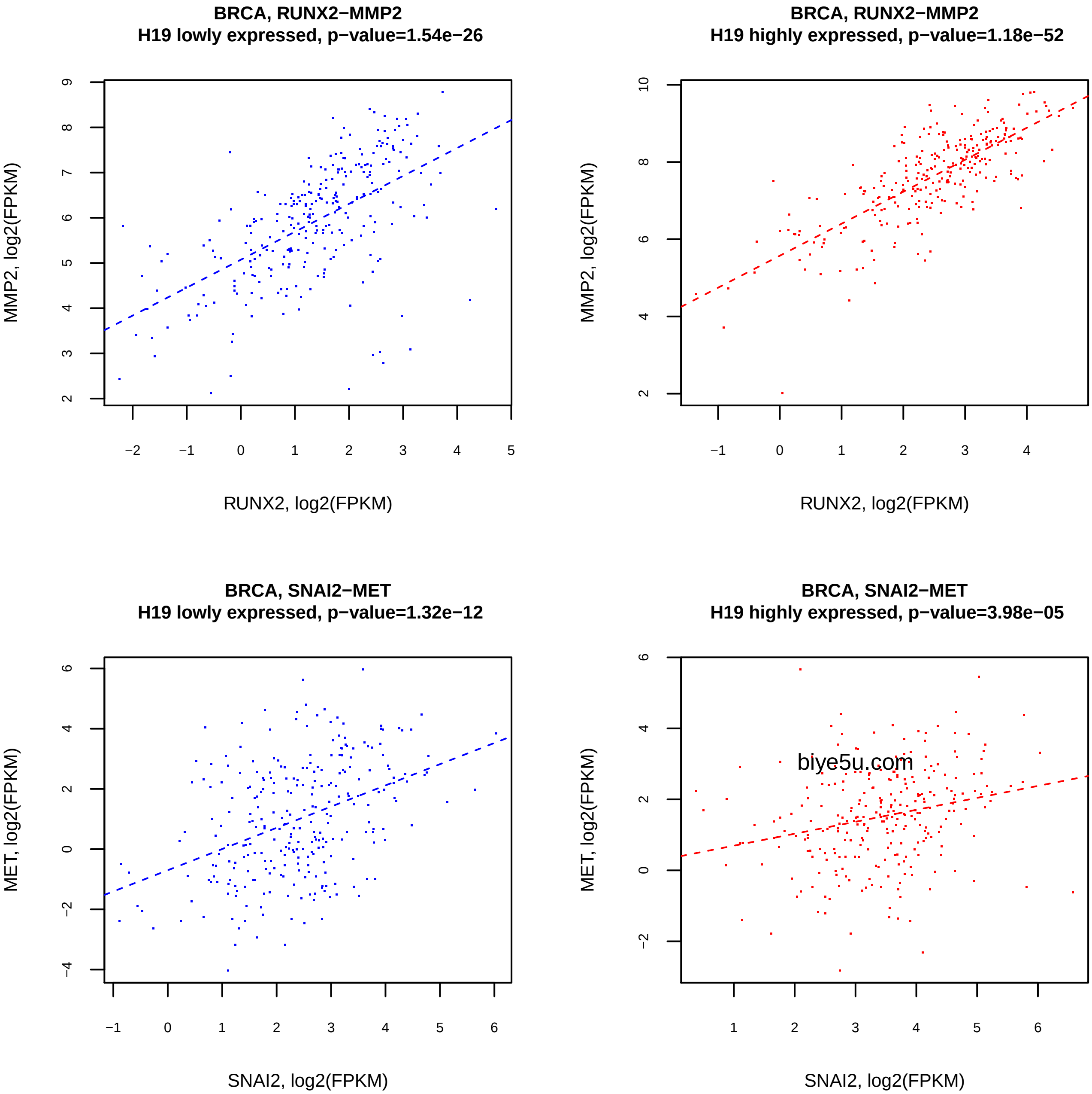
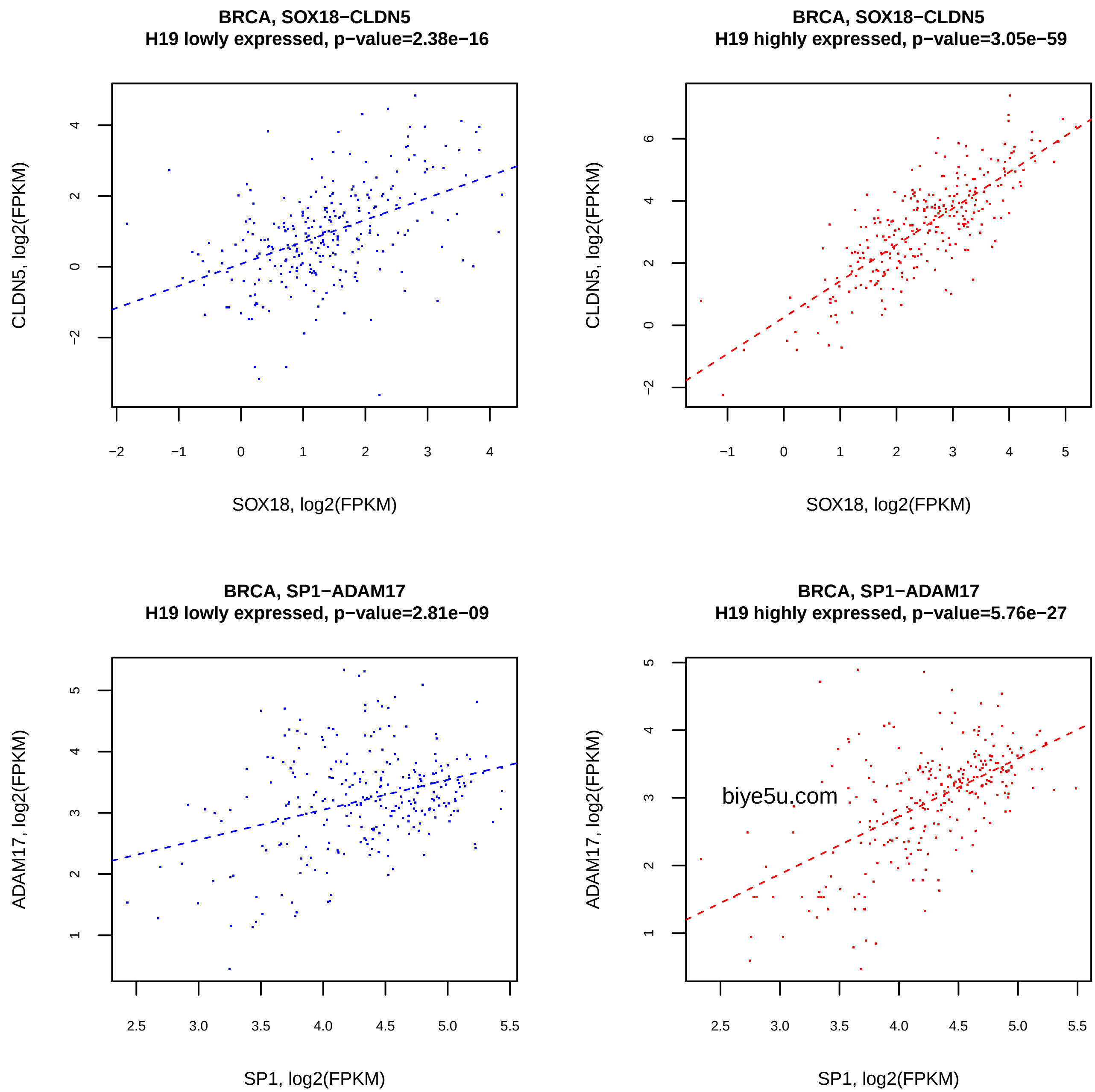

BRCA, PPARA−KLF11
H19 lowly expressed, p−value=6.81e−15
KLF11, log2(FPKM)
PPARA, log2(FPKM)
BRCA, PPARA−KLF11
H19 highly expressed, p−value=5.66e−38
KLF11, log2(FPKM)
PPARA, log2(FPKM)
BRCA, RB1−WRN
H19 lowly expressed, p−value=3.09e−05
WRN, log2(FPKM)
RB1, log2(FPKM)
BRCA, RB1−WRN
H19 highly expressed, p−value=9.54e−15
WRN, log2(FPKM)
RB1, log2(FPKM)
biye5u.com


BRCA, RUNX2−MMP2
H19 lowly expressed, p−value=1.54e−26
MMP2, log2(FPKM)
RUNX2, log2(FPKM)
BRCA, RUNX2−MMP2
H19 highly expressed, p−value=1.18e−52
MMP2, log2(FPKM)
RUNX2, log2(FPKM)
BRCA, SNAI2−MET
H19 lowly expressed, p−value=1.32e−12
MET, log2(FPKM)
SNAI2, log2(FPKM)
BRCA, SNAI2−MET
H19 highly expressed, p−value=3.98e−05
MET, log2(FPKM)
SNAI2, log2(FPKM)



BRCA, SOX18−CLDN5
H19 lowly expressed, p−value=2.38e−16
CLDN5, log2(FPKM)
SOX18, log2(FPKM)
BRCA, SOX18−CLDN5
H19 highly expressed, p−value=3.05e−59
CLDN5, log2(FPKM)
SOX18, log2(FPKM)
BRCA, SP1−ADAM17
H19 lowly expressed, p−value=2.81e−09
ADAM17, log2(FPKM)
SP1, log2(FPKM)
BRCA, SP1−ADAM17
H19 highly expressed, p−value=5.76e−27
ADAM17, log2(FPKM)
SP1, log2(FPKM)
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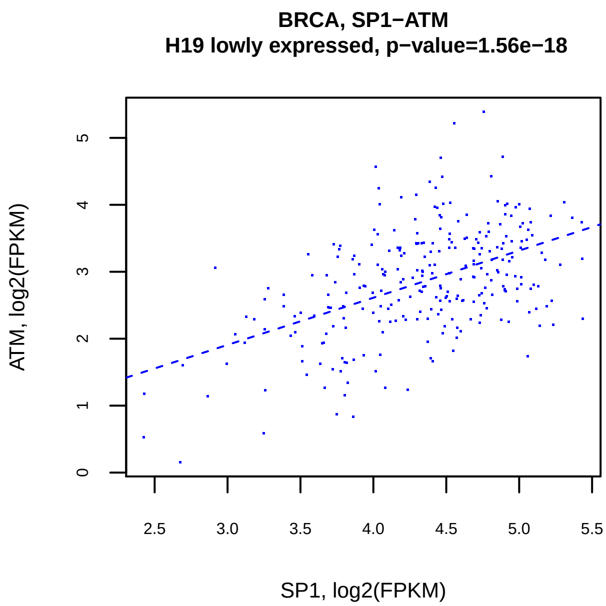
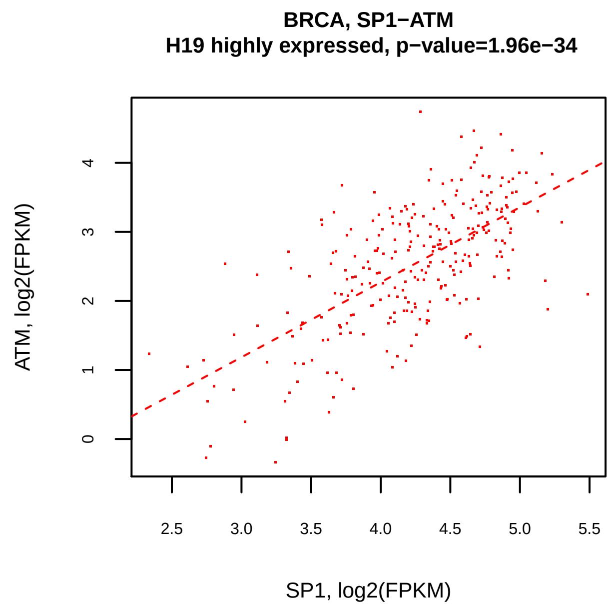
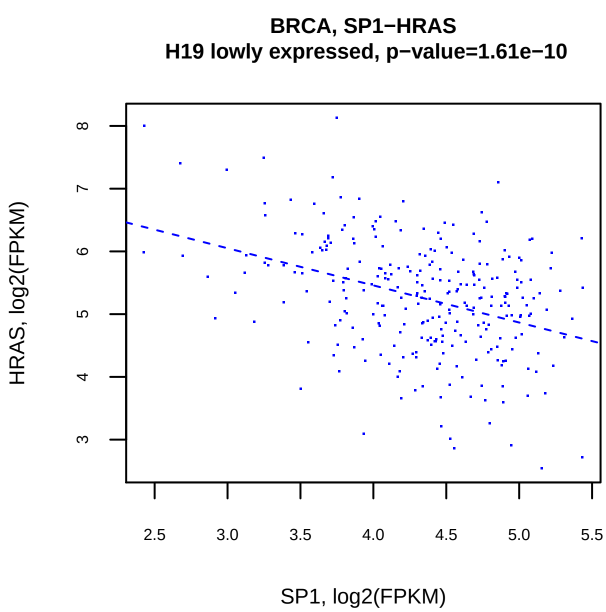
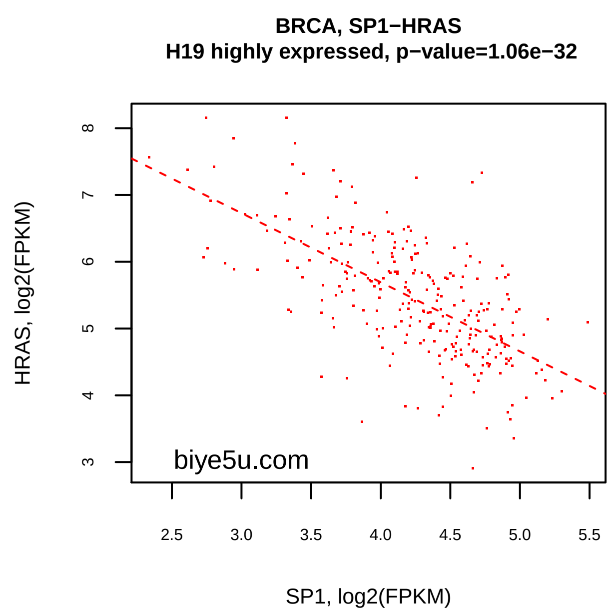

BRCA, SP1−ATM
H19 lowly expressed, p−value=1.56e−18
ATM, log2(FPKM)
SP1, log2(FPKM)


BRCA, SP1−ATM
H19 highly expressed, p−value=1.96e−34
ATM, log2(FPKM)
SP1, log2(FPKM)


BRCA, SP1−HRAS
H19 lowly expressed, p−value=1.61e−10
HRAS, log2(FPKM)
SP1, log2(FPKM)


BRCA, SP1−HRAS
H19 highly expressed, p−value=1.06e−32
HRAS, log2(FPKM)
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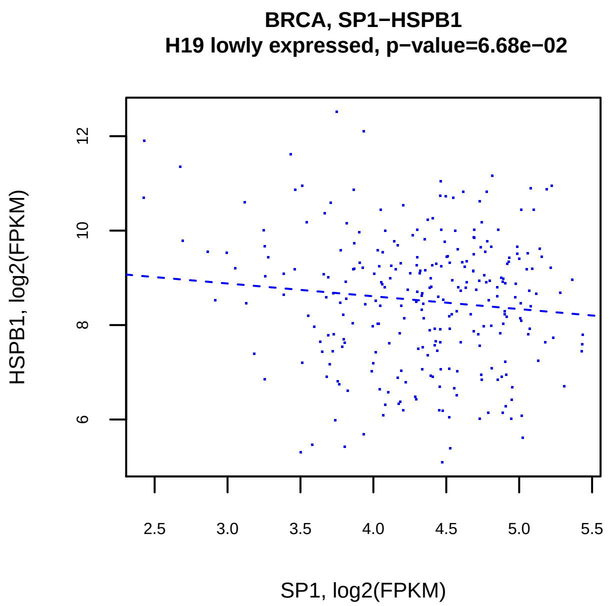
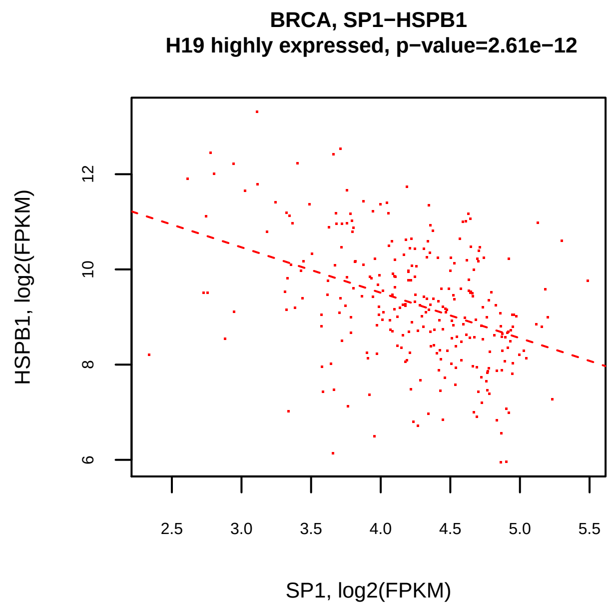
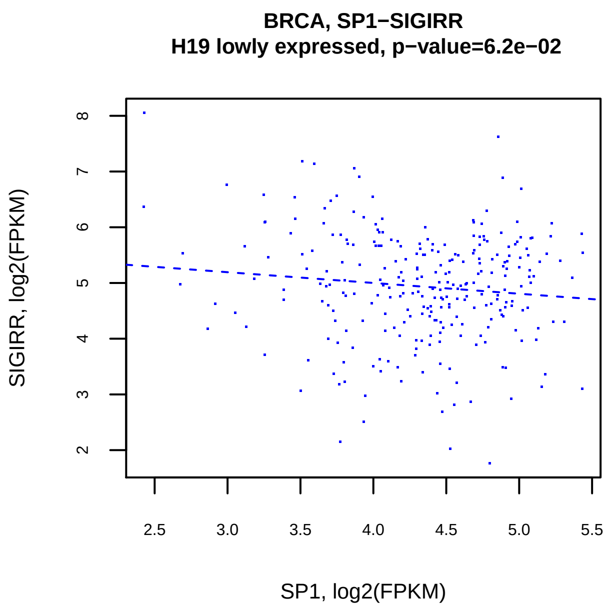
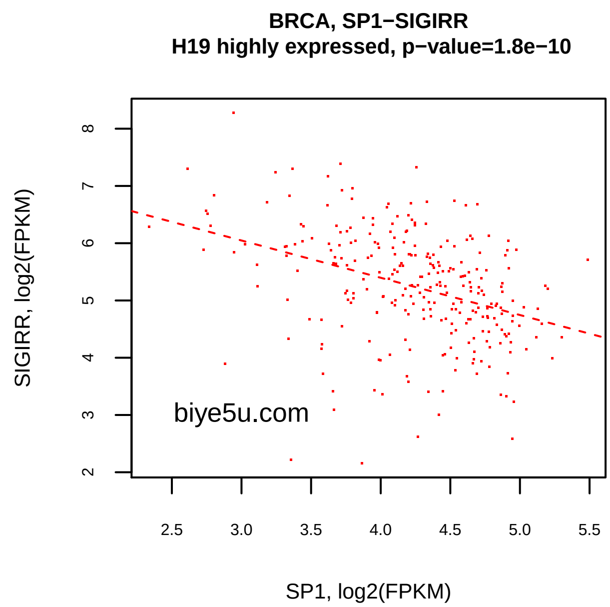
SP1, log2(FPKM)


BRCA, SP1−HSPB1
H19 lowly expressed, p−value=6.68e−02
HSPB1, log2(FPKM)
SP1, log2(FPKM)
2.5
3.0
3.5
4.0
4.5
5.0
5.5
6
8
10
12


BRCA, SP1−HSPB1
H19 highly expressed, p−value=2.61e−12
HSPB1, log2(FPKM)
SP1, log2(FPKM)
2.5
3.0
3.5
4.0
4.5
5.0
5.5
6
8
10
12


BRCA, SP1−SIGIRR
H19 lowly expressed, p−value=6.2e−02
SIGIRR, log2(FPKM)
SP1, log2(FPKM)
2.5
3.0
3.5
4.0
4.5
5.0
5.5
2
3
4
5
6
7
8


BRCA, SP1−SIGIRR
H19 highly expressed, p−value=1.8e−10
SIGIRR, log2(FPKM)
SP1, log2(FPKM)
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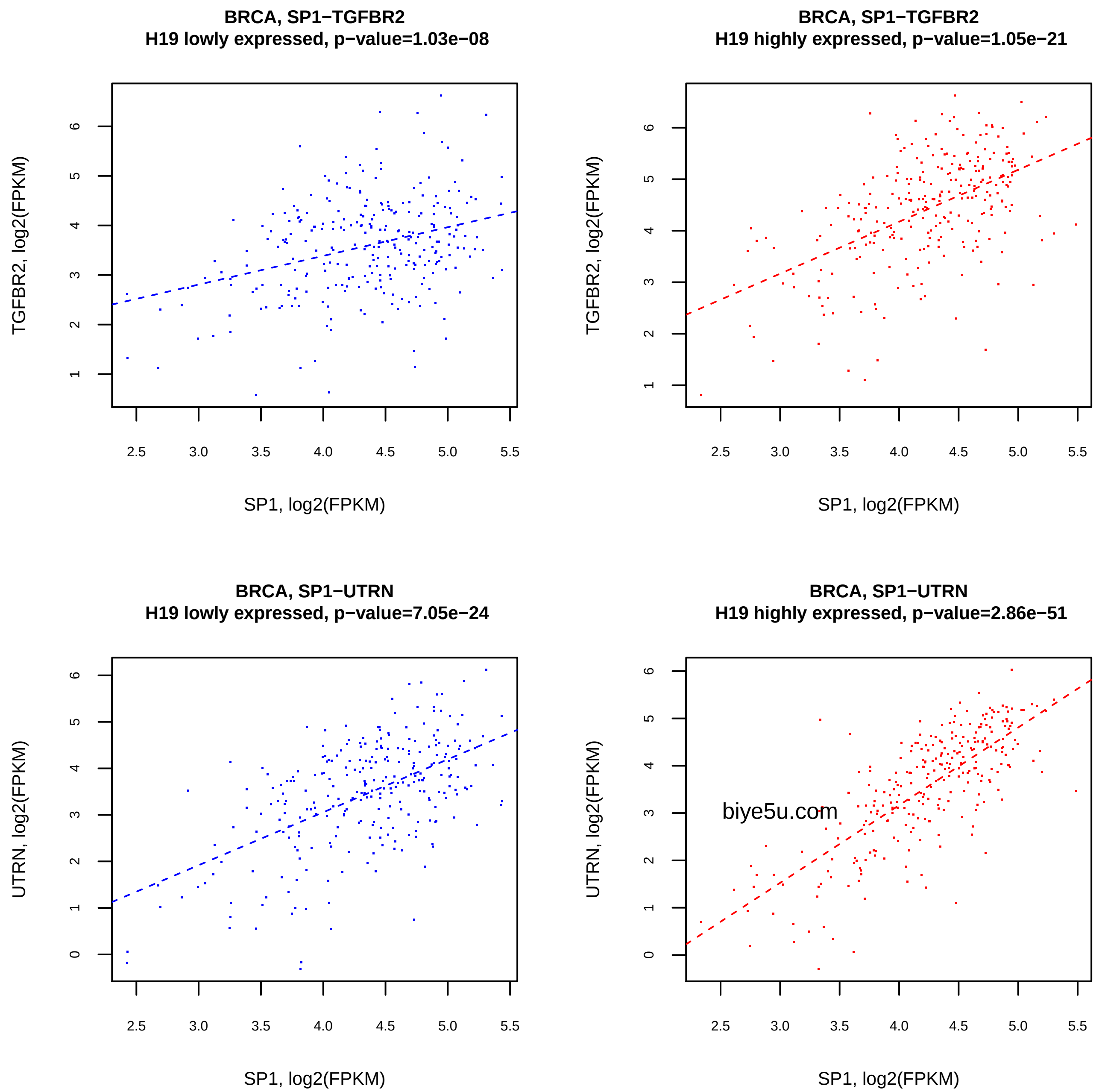
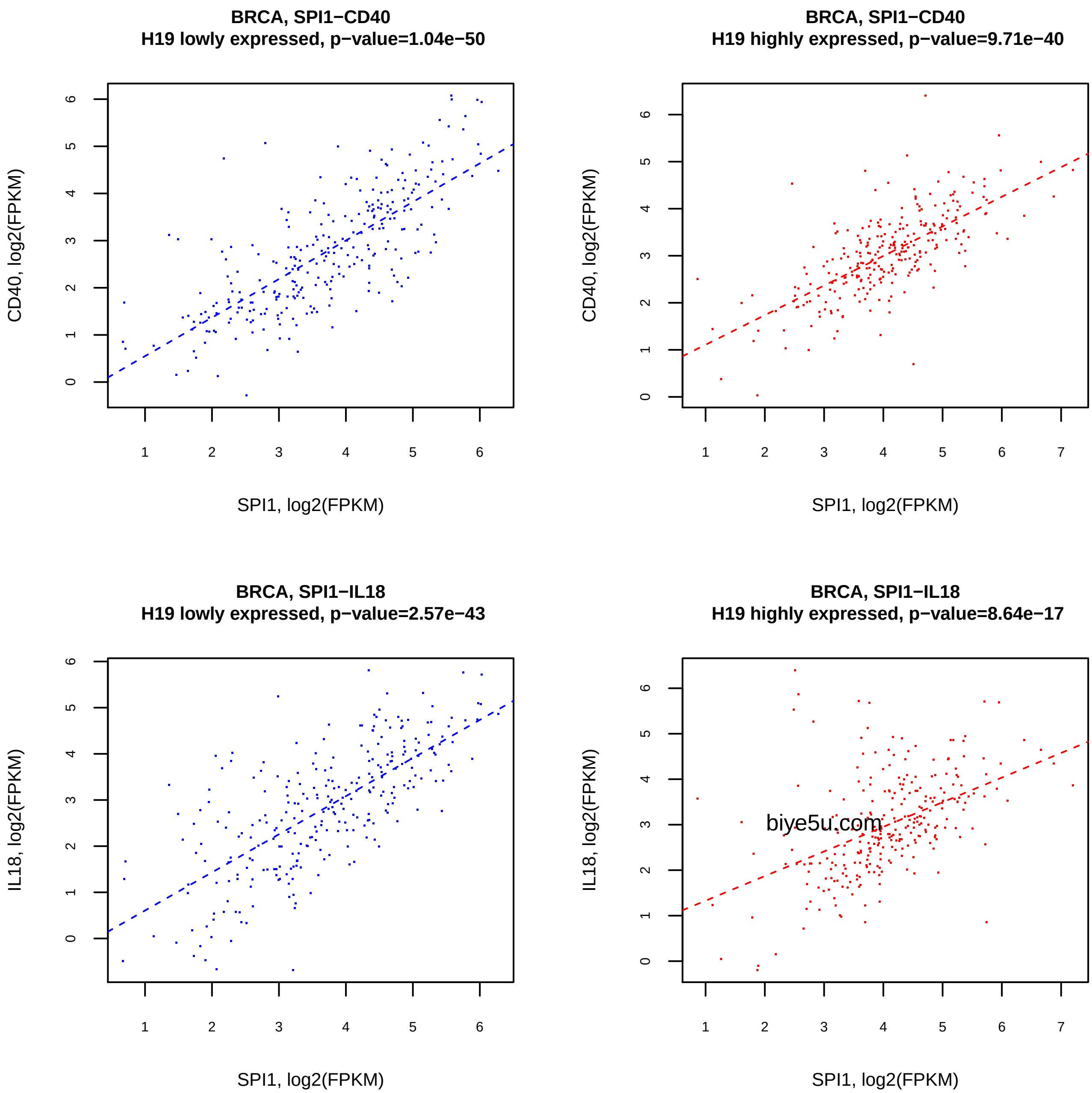
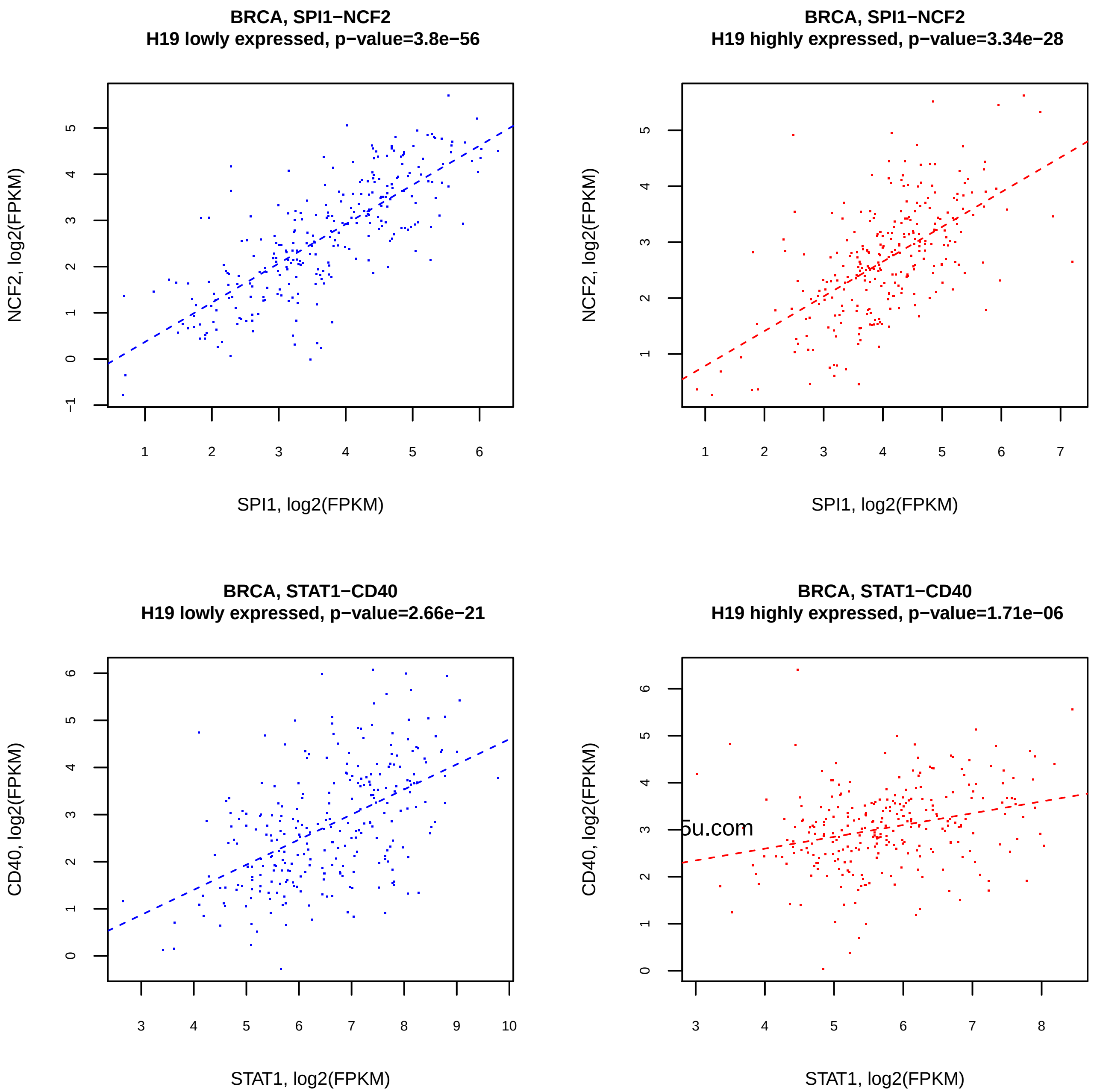
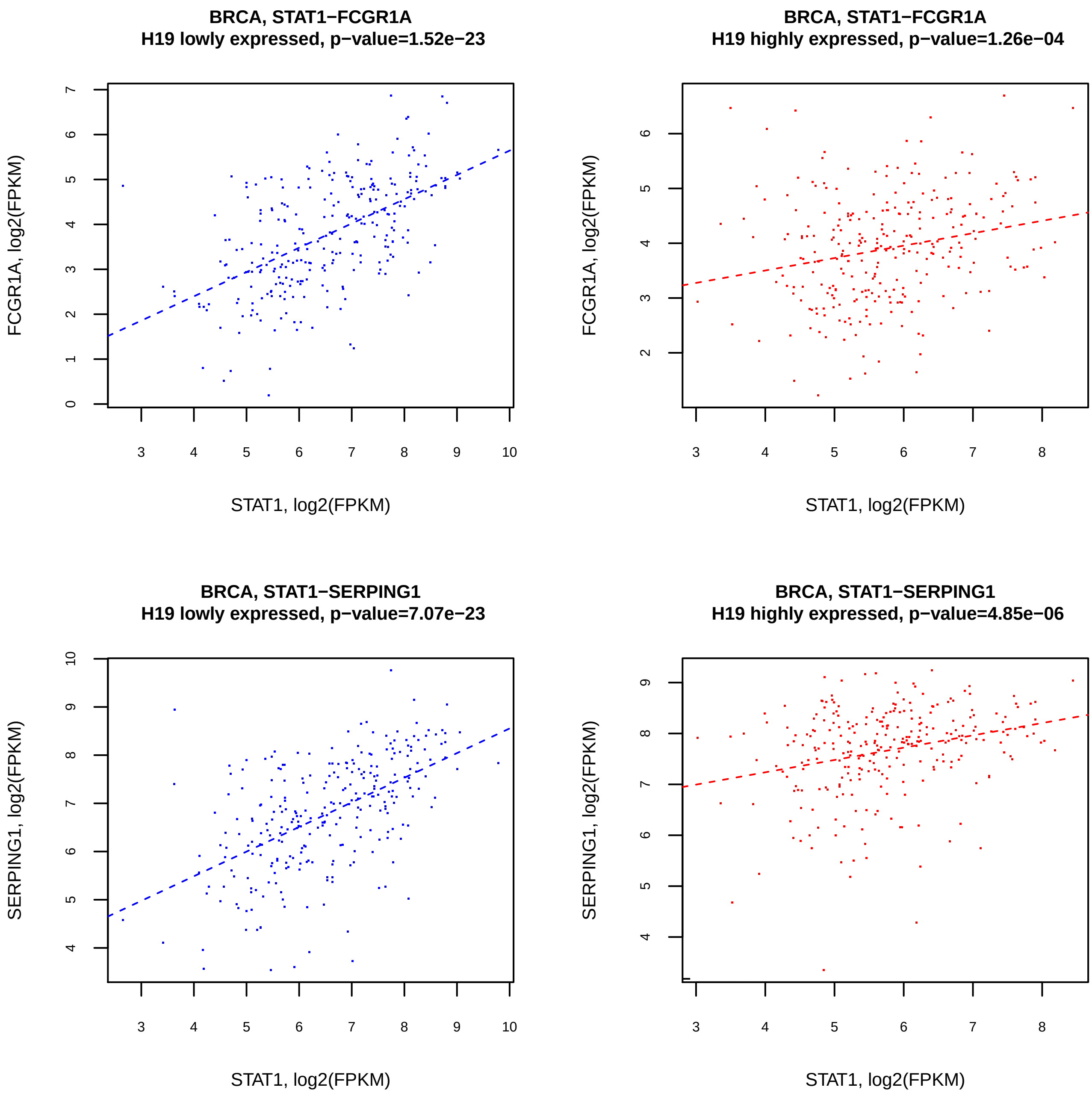
2.5
3.0
3.5
4.0
4.5
5.0
5.5
2
3
4
5
6
7
8

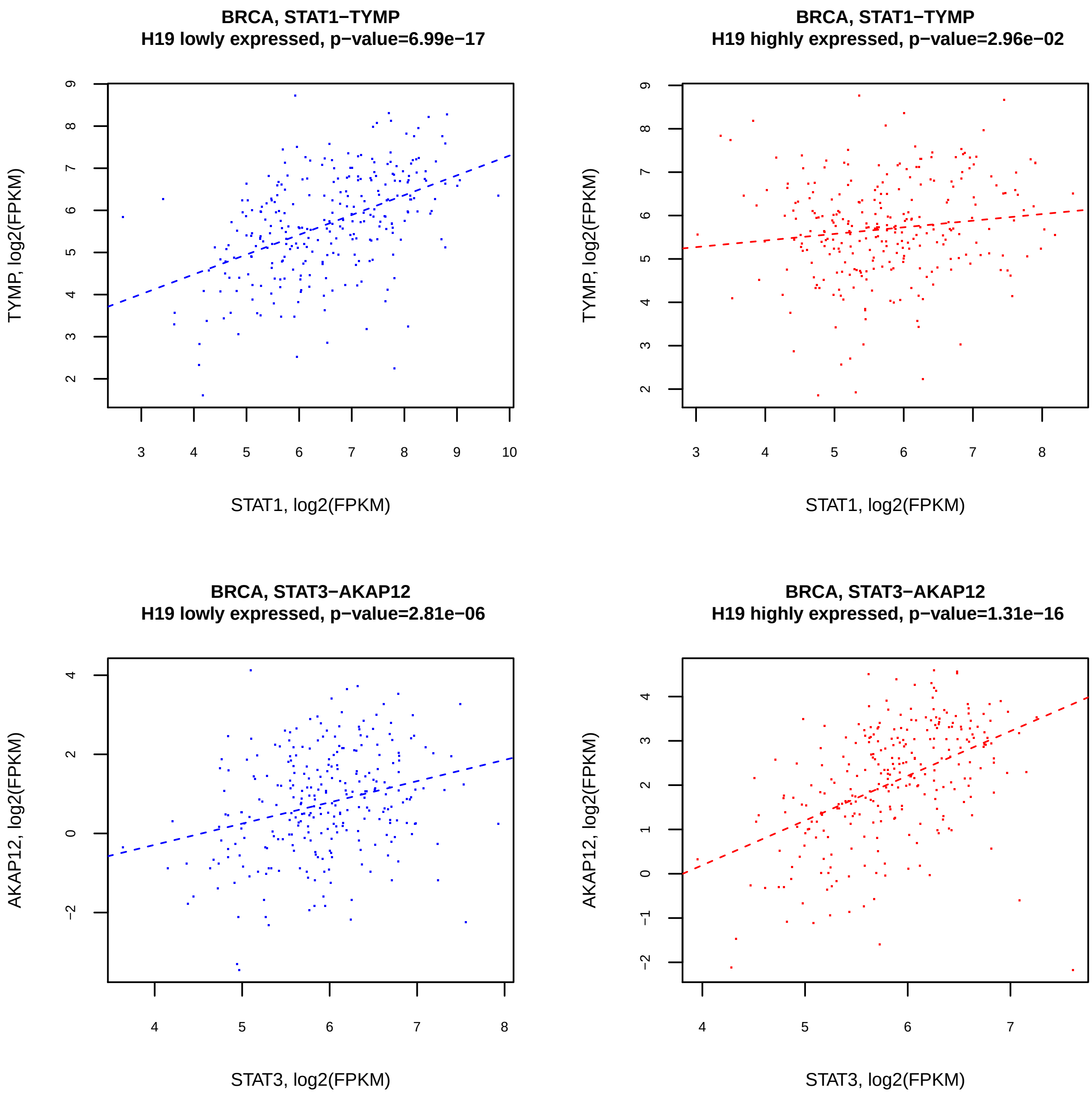

BRCA, SP1−TGFBR2
H19 lowly expressed, p−value=1.03e−08
TGFBR2, log2(FPKM)
SP1, log2(FPKM)
1 2 3 4 5 6
2.5 3.0 3.5 4.0 4.5 5.0 5.5
BRCA, SP1−TGFBR2
H19 highly expressed, p−value=1.05e−21
TGFBR2, log2(FPKM)
SP1, log2(FPKM)
1 2 3 4 5 6
2.5 3.0 3.5 4.0 4.5 5.0 5.5
BRCA, SP1−UTRN
H19 lowly expressed, p−value=7.05e−24
UTRN, log2(FPKM)
SP1, log2(FPKM)
0 1 2 3 4 5 6
2.5 3.0 3.5 4.0 4.5 5.0 5.5
BRCA, SP1−UTRN
H19 highly expressed, p−value=2.86e−51
UTRN, log2(FPKM)
SP1, log2(FPKM)
0 1 2 3 4 5 6
2.5 3.0 3.5 4.0 4.5 5.0 5.5
biye5u.com

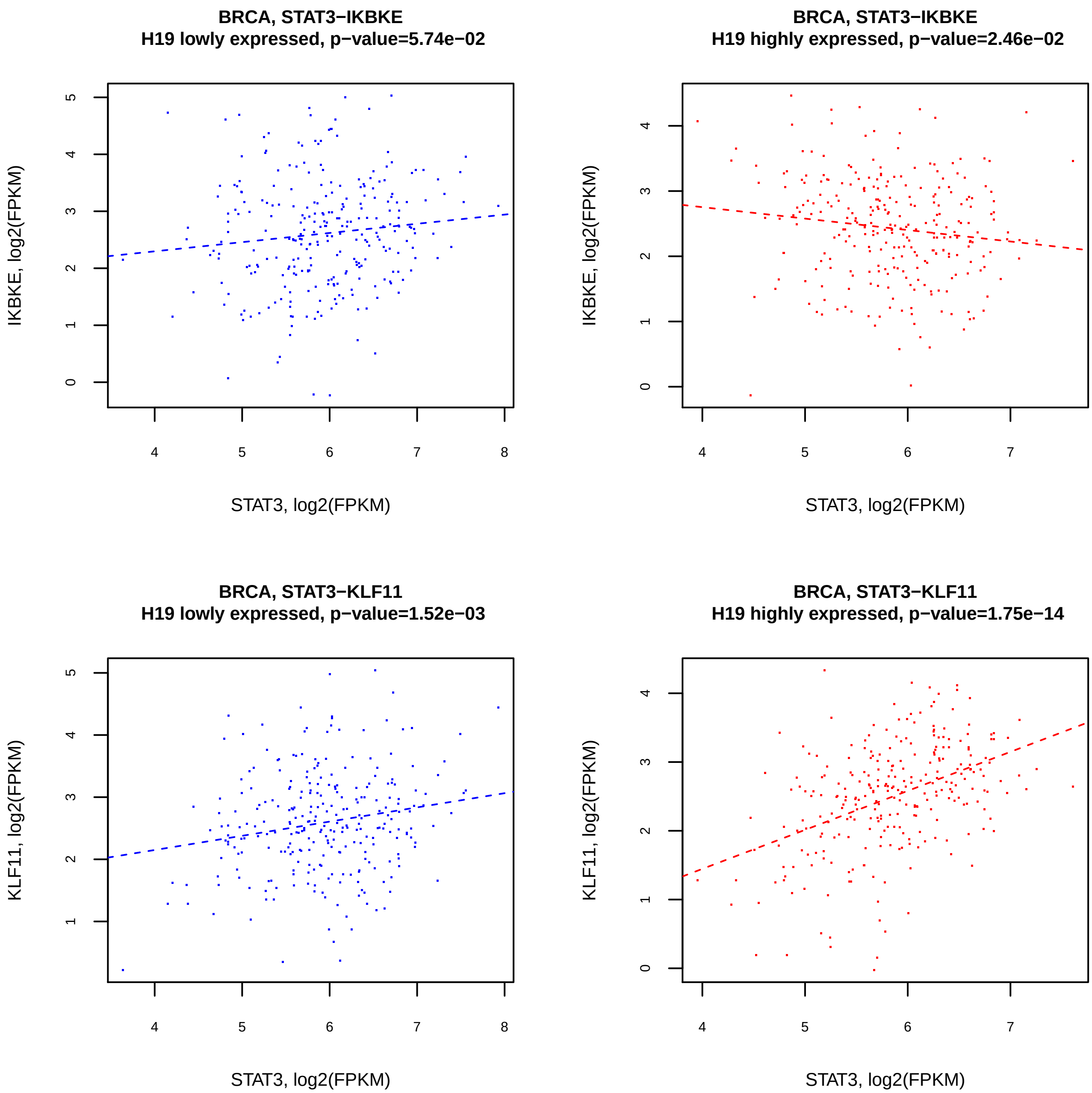

BRCA, SPI1−CD40
H19 lowly expressed, p−value=1.04e−50
CD40, log2(FPKM)
SPI1, log2(FPKM)
BRCA, SPI1−CD40
H19 highly expressed, p−value=9.71e−40
CD40, log2(FPKM)
SPI1, log2(FPKM)
BRCA, SPI1−IL18
H19 lowly expressed, p−value=2.57e−43
IL18, log2(FPKM)
SPI1, log2(FPKM)
BRCA, SPI1−IL18
H19 highly expressed, p−value=8.64e−17
IL18, log2(FPKM)
SPI1, log2(FPKM)
biye5u.com

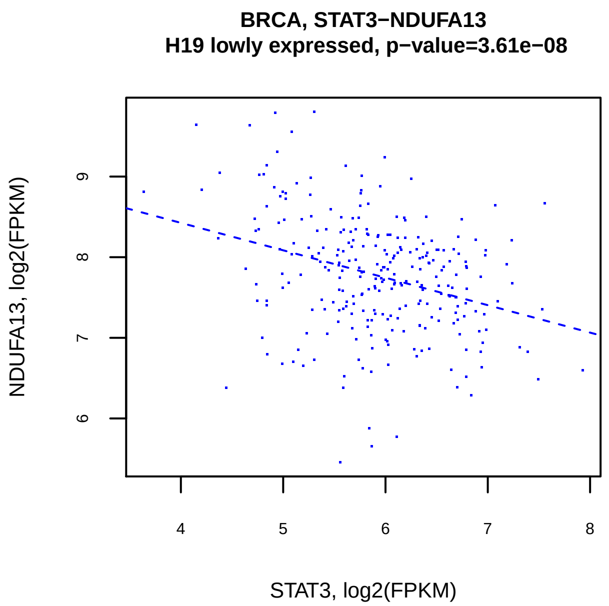


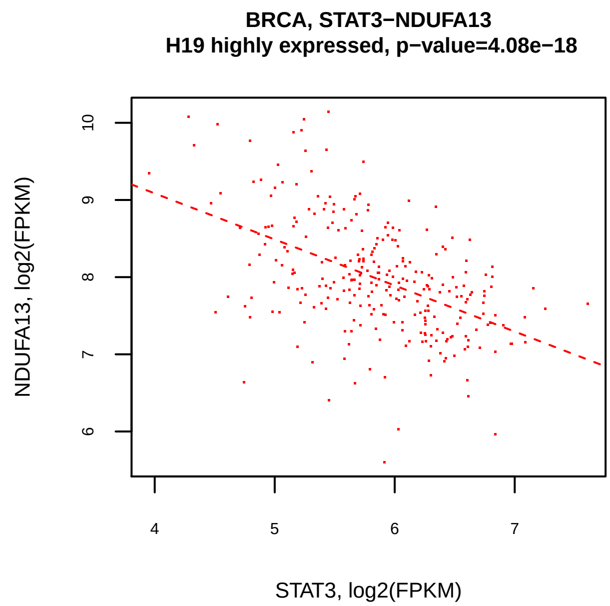
BRCA, SPI1−NCF2
H19 lowly expressed, p−value=3.8e−56
NCF2, log2(FPKM)
SPI1, log2(FPKM)
BRCA, SPI1−NCF2
H19 highly expressed, p−value=3.34e−28
NCF2, log2(FPKM)
SPI1, log2(FPKM)
BRCA, STAT1−CD40
H19 lowly expressed, p−value=2.66e−21
CD40, log2(FPKM)
STAT1, log2(FPKM)
BRCA, STAT1−CD40
H19 highly expressed, p−value=1.71e−06
CD40, log2(FPKM)
STAT1, log2(FPKM)

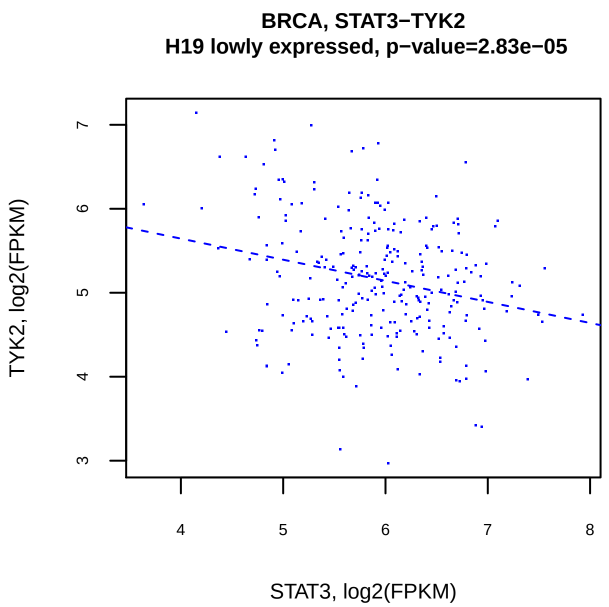

BRCA, STAT1−FCGR1A
H19 lowly expressed, p−value=1.52e−23
FCGR1A, log2(FPKM)
STAT1, log2(FPKM)
BRCA, STAT1−FCGR1A
H19 highly expressed, p−value=1.26e−04
FCGR1A, log2(FPKM)
STAT1, log2(FPKM)
BRCA, STAT1−SERPING1
H19 lowly expressed, p−value=7.07e−23
SERPING1, log2(FPKM)
STAT1, log2(FPKM)
BRCA, STAT1−SERPING1
H19 highly expressed, p−value=4.85e−06
SERPING1, log2(FPKM)
STAT1, log2(FPKM)


BRCA, STAT1−TYMP
H19 lowly expressed, p−value=6.99e−17
TYMP, log2(FPKM)
STAT1, log2(FPKM)
BRCA, STAT1−TYMP
H19 highly expressed, p−value=2.96e−02
TYMP, log2(FPKM)
STAT1, log2(FPKM)
BRCA, STAT3−AKAP12
H19 lowly expressed, p−value=2.81e−06
AKAP12, log2(FPKM)
STAT3, log2(FPKM)
BRCA, STAT3−AKAP12
H19 highly expressed, p−value=1.31e−16
AKAP12, log2(FPKM)
STAT3, log2(FPKM)


BRCA, STAT3−IKBKE
H19 lowly expressed, p−value=5.74e−02
IKBKE, log2(FPKM)
STAT3, log2(FPKM)
BRCA, STAT3−IKBKE
H19 highly expressed, p−value=2.46e−02
IKBKE, log2(FPKM)
STAT3, log2(FPKM)
BRCA, STAT3−KLF11
H19 lowly expressed, p−value=1.52e−03
KLF11, log2(FPKM)
STAT3, log2(FPKM)
BRCA, STAT3−KLF11
H19 highly expressed, p−value=1.75e−14
KLF11, log2(FPKM)
STAT3, log2(FPKM)


BRCA, STAT3−NDUFA13
H19 lowly expressed, p−value=3.61e−08
NDUFA13, log2(FPKM)
STAT3, log2(FPKM)


BRCA, STAT3−NDUFA13
H19 highly expressed, p−value=4.08e−18
NDUFA13, log2(FPKM)
STAT3, log2(FPKM)


BRCA, STAT3−TYK2
H19 lowly expressed, p−value=2.83e−05
TYK2, log2(FPKM)
STAT3, log2(FPKM)

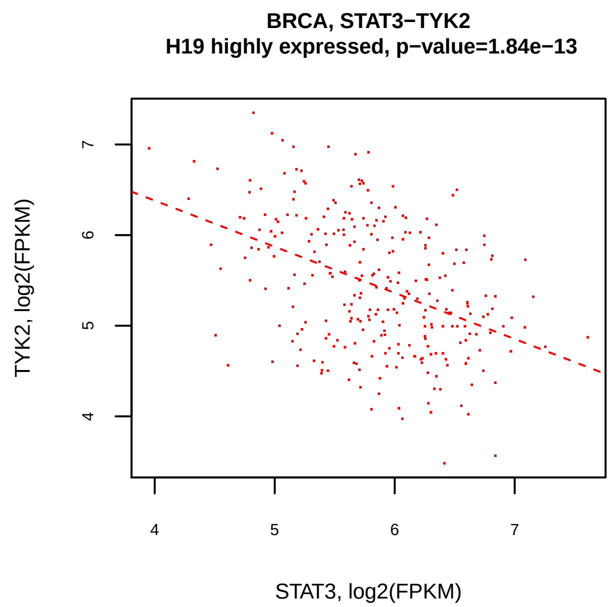

BRCA, STAT3−TYK2
H19 highly expressed, p−value=1.84e−13
TYK2, log2(FPKM)
STAT3, log2(FPKM)

Table S1. Number of Samples and Genes

Cancer			Samples				After FKPM Filtration		TF-gene Interactions		
No	**Cancer Type Abbreviation**	**Cancer Type Name**	**Total Number of Samples**	**# Primary Tumor Samples**	**# Matched Controls**	**# Other Samples**	**# Genes**	**Number of TFs**	**# Pairs (TF-gene)**	**# TFs**	**# Genes**
1	BLCA	Bladder urothelial carcinoma	426	407	19	0	11481	683	7723	607	2103
2	BRCA	Breast invasive carcinoma	1212	1092	113	7	11867	694	8181	625	2198
3	CESC	Cervical squamous cell carcinoma and endocervical adenocarcinoma	309	304	3	2	11508	709	8057	634	2161
4	COAD	Colon adenocarcinoma	331	288	41	2	11537	700	8123	631	2187
5	ESCA	Esophageal carcinoma	195	181	13	1	11727	723	8277	655	2205
6	GBM	Glioblastoma multiforme	171	153	5	13	12279	717	7755	636	2156
7	HNSC	carcinoma	564	518	44	2	11406	691	7866	621	2140
8	KIRC	Kidney renal clear cell carcinoma	91	66	25	0	11881	697	7889	628	2172
9	KIRP	Kidney renal papillary cell carcinoma	321	288	32	1	11599	667	7130	591	2030
10	LGG	Brain lower grade glioma	523	509	0	14	12104	678	6837	589	1996
11	LIHC	Liver hepatocellular carcinoma	421	369	50	2	10577	622	6988	546	1964
12	LUAD	Lung adenocarcinoma	574	513	59	2	12065	695	8223	621	2233
13	LUSC	Lung squamous cell carcinoma	548	498	50	0	12002	720	8444	653	2281
14	OV	Ovarian serous cystadenocarcinoma	427	419	0	8	11838	699	8030	622	2159
15	PAAD	Pancreatic adenocarcinoma	183	178	4	1	12346	722	8758	651	2369
16	PCPG	Paraganglioma	185	177	3	5	11520	660	6438	562	1896
17	PRAD	Prostate adenocarcinoma	548	495	52	1	11785	700	7889	624	2170
18	SARC	Sarcoma	264	258	2	4	11343	690	7353	602	2053
19	SKCM	Skin cutaneous melanoma	470	102	1	367	11028	667	7055	585	1982
20	STAD	Stomach adenocarcinoma	450	414	36	0	11792	726	8460	648	2252
21	TGCT	Testicular germ cell tumors	154	148	0	6	12184	701	8042	620	2202
22	THCA	Thyroid carcinoma	571	504	59	8	11693	666	7284	587	2020
23	THYM	Thymoma	571	504	59	8	11757	680	7270	602	2055
24	UCEC	Uterine corpus endometrial carcinoma	204	180	23	1	11718	698	8092	625	2152

Table S2. Regression of H19's regulation on TF-gene pairs

Triplet	BRCA	COAD	HNSC	KIRC	LGG	LUAD	PAAD	STAD	TGCT	THCA	# of cancer types	H19 lowley expressed	H19 highly expressed
H19_AHR_HSPB1	5.05									2.98	2	⊣	⊣⊣
H19_AIP_RSF1	2.97									2.77	2	⊣	⊣⊣
H19_EZH2_DACT3	5.87							4.90			2	⊣	⊣⊣
H19_NFKB1_MIF	2.47						3.33				2	⊣	⊣⊣
H19_NFYB_EDF1	5.59									2.28	2	⊣	⊣⊣
H19_SP1_HRAS	4.02									4.98	2	⊣	⊣⊣
H19_SP1_HSPB1	3.50									2.54	2	⊣	⊣⊣
H19_SP1_SIGIRR	3.15									2.16	2	⊣	⊣⊣
H19_SP3_EDF1				5.92						4.91	2	⊣	⊣⊣
H19_STAT3_NDUFA13	2.54									2.93	2	⊣	⊣⊣
H19_STAT3_TYK2	2.57									3.18	2	⊣	⊣⊣
H19_AHR_CCNG2	2.99						2.38				2	→	→→
H19_AHR_SOS1	3.91						2.73			2.94	3	→	→→
H19_CREBBP_CREB1	3.13					3.94					2	→	→→
H19_E2F3_MAPK8	4.49									3.59	2	→	→→
H19_EGR1_SPRY1	3.44				3.38						2	→	→→
H19_ERG_EPB41L3							2.22			2.84	2	→	→→
H19_ETS1_TGFBR2	9.19			4.21							2	→	→→
H19_EZH2_BRCA1	3.70				4.87						2	→	→→
H19_FLI1_CTGF	2.51	3.53									2	→	→→
H19_FLI1_TGFBR2	6.02		4.14								2	→	→→
H19_FOSL2_BCL6	3.02	6.40									2	→	→→
H19_FOXM1_CCNB1					3.83				3.39		2	→	→→
H19_FOXO1_TXNIP	2.93			3.12							2	→	→→
H19_GATA2_VWF	3.20			8.26							2	→	→→
H19_HNRNPK_EIF4E						2.92				5.33	2	→	→→
H19_KAT2B_SMAD4	5.05									2.19	2	→	→→
H19_KAT2B_ZEB1	2.66						2.78				2	→	→→
H19_KLF4_IL6	4.16									3.96	2	→	→→
H19_KLF6_TXNIP	3.26					2.66					2	→	→→
H19_NFKB1_CHUK	3.60									5.56	2	→	→→

Triplet	BRCA	COAD	HNSC	KIRC	LGG	LUAD	PAAD	STAD	TGCT	THCA	# of cancer types	H19 lowley expressed	H19 highly expressed
H19_NFYB_HMGCS1	2.37									3.79	2	→	→→
H19_NFYB_SP3	7.48									2.79	2	→	→→
H19_NR3C1_CALD1	5.86									2.72	2	→	→→
H19_PPARA_KLF11	6.41									3.46	2	→	→→
H19_RB1_WRN	2.40									2.86	2	→	→→
H19_RUNX2_MMP2	3.20									2.81	2	→	→→
H19_SOX18_CLDN5	9.50					3.07					2	→	→→
H19_SP1_ADAM17	3.71									5.66	2	→	→→
H19_SP1_ATM	3.51									5.70	2	→	→→
H19_SP1_TGFBR2	2.91									4.08	2	→	→→
H19_SP1_UTRN	4.22									3.01	2	→	→→
H19_STAT3_AKAP12	2.67									3.59	2	→	→→
H19_STAT3_KLF11	3.53									3.41	2	→	→→
H19_TWIST2_SRPX						3.97	3.33				2	→	→→
H19_AHR_CYP1B1									2.45	7.59	2	→→	→
H19_AKNA_CD40	2.68						3.30				2	→→	→
H19_CIITA_HLA-DRA	3.73									3.68	2	→→	→
H19_IRF8_CD68							4.43			5.10	2	→→	→
H19_SNAI2_MET	2.58		5.20								2	→→	→
H19_SPI1_ACP5							2.42			4.55	2	→→	→
H19_SPI1_CD40	3.07							3.39			2	→→	→
H19_SPI1_IL18	3.75									3.14	2	→→	→
H19_SPI1_NCF2	3.67						2.63				2	→→	→
H19_STAT1_CD40	4.37									3.12	2	→→	→
H19_STAT1_FCGR1A	4.69									2.73	2	→→	→
H19_STAT1_SERPING1	4.06									4.74	2	→→	→
H19_STAT1_TYMP	3.88					3.72					2	→→	→
H19_GATA2_VCAM1	2.95			6.16							2	⊣	→
H19_NFKB1_NCAM1							3.51			3.86	2	⊣	→
H19_SP1_ME1						4.42				5.08	2	⊣	→
H19_TP53_IGFBP3					4.07					3.41	2	⊣	→
H19_CTCF_IPO13						3.15				3.26	2	→	⊣
H19_E2F1_GADD45B	5.75	3.86									2	→	⊣

Triplet	BRCA	COAD	HNSC	KIRC	LGG	LUAD	PAAD	STAD	TGCT	THCA	# of cancer types	H19 lowley expressed	H19 highly expressed
H19_E2F1_MYC							3.64			6.27	2	→	⊣
H19_EZH2_CIITA							3.52	4.20			2	→	⊣
H19_EZH2_SNAI2	6.04	4.55									2	→	⊣
H19_FOXO1_HYOU1						2.64			9.10		2	→	⊣
H19_HDAC1_TXNIP	4.88					4.11					2	→	⊣
H19_HDAC2_TWIST1	2.77	3.76									2	→	⊣
H19_HDGF_FAS	6.14						7.27				2	→	⊣
H19_IKZF1_BIRC5	4.72						3.70				2	→	⊣
H19_MYB_COL1A1		4.33						4.66			2	→	⊣
H19_MYBL2_COL1A1	11.03	4.48						6.07			3	→	⊣
H19_MYC_E2F1							4.03			5.84	2	→	⊣
H19_NFKB2_HIF1A						3.54	3.57				2	→	⊣
H19_PARP1_FBN1	2.70								5.57		2	→	⊣
H19_PARP1_FN1	3.53	3.08									2	→	⊣
H19_POU2AF1_TK1	5.63						7.38				2	→	⊣
H19_POU2F1_VWF						7.74		5.91			2	→	⊣
H19_RELA_BGN							3.90			3.75	2	→	⊣
H19_RUNX1_SYMPK		5.54				7.74				5.65	3	→	⊣
H19_SOX9_CD3E				4.64			5.49				2	→	⊣
H19_SP1_ABCA2						8.08				4.60	2	→	⊣
H19_SP1_FLNA						5.20				5.60	2	→	⊣
H19_STAT3_DNMT1						4.92				3.38	2	→	⊣
H19_STAT3_IKBKE	2.59							6.50			2	→	⊣
H19_USF1_FMR1							3.09			2.91	2	→	⊣

Notes: The values are transformed as -log10(p-value). Pattern: ⟶ activation, ⊣ repression.

Table S3. TF-gene pairs modulated by H19 and their evidences that related to specific cancers.

No	TF/Gene	BRCA	COAD	HNSC	KIRC	LGG	LUAD	PAAD	STAD	TGCT	THCA
1	AHR	[1]						[2]			
	CCNG2	[3]						[4]			
2	AHR									[5]	[6]
	CYP1B1									[7]	[8]
3	AHR	[1]									[6]
	HSPB1	[9]									[10]
4	AHR	[1]						[2]			[6]
	SOS1	[11]						[12]			[13]
5	AIP	[14]									[15]
	RSF1	[16]									[17]
6	AKNA	[18]						[19]			
	CD40	[20]						[21]			
7	CIITA	[22]									[23]
	HLA-DRA	[24]									[25]
8	CREBBP	[26]					[27]				
	CREB1	[28]					[29]				
9	CTCF						[30]				[31]
	IPO13						?				?
10	E2F1	[32]	[33]								
	GADD45B	[34]	[35]								
11	E2F1							[36]			[37]
	MYC							[38]			[39]
12	E2F3	[40]									[41]
	MAPK8	[42]									[43]
13	EGR1	[44]				[45]					
	SPRY1	[46]				[47]					
14	ERG							[48]			[49]
	EPB41L3							[50]			[51]
15	ETS1	[52]			[53]						
	TGFBR2	[54]			[55]						
16	EZH2	[56]				[57]					
	BRCA1	[58]				[59]					
17	EZH2							[60]	[61]		
	CIITA							[62]	[63]		
18	EZH2	[56]							[61]		
	DACT3	[64]							?		
19	EZH2	[56]	[65]								
	SNAI2	[66]	[67]								
20	FLI1	[68]	[69]								
	CTGF	[70]	[71]								

No	TF/Gene	BRCA	COAD	HNSC	KIRC	LGG	LUAD	PAAD	STAD	TGCT	THCA
21	FLI1	[68]		[72]							
	TGFBR2	[52]		[73]							
22	FOSL2	[74]	[75]								
	BCL6	[76]	[77]								
23	FOXM1	[78]				[79]				[80]	
	CCNB1	[81]				[82]				[83]	
24	FOXO1	[84]					[85]			[86]	
	HYOU1	[87]					[88]			?	
25	FOXO1	[84]			[89]						
	TXNIP	[90]			[91]						
26	GATA2	[92]			[93]						
	VCAM1	[94]			[93]						
27	GATA2	[92]			[93]						
	VWF	[95]			[96]						
28	HDAC1	[97]					[98]				
	TXNIP	[90]					[99]				
29	HDAC2	[100]	[101]								
	TWIST1	[102]	[103]								
30	HDGF	[104]						[105]			
	FAS	[106]						[107]			
31	HNRNPK						[108]				[109]
	EIF4E						[110]				[111]
32	IKZF1	[112]						[113]			
	BIRC5	[114]						[115]			
33	IRF8							[116]			[117]
	CD68							[118]			[119]
34	KAT2B	[120]									[121]
	SMAD4	[122]									[123]
35	KAT2B	[120]						[124]			
	ZEB1	[125]						[126]			
36	KLF4	[127]									[128]
	IL6	[129]									[130]
37	KLF6	[131]					[132]				
	TXNIP	[90]					[99]				
38	MYB		[133]						[134]		
	COL1A1		[135]						[136]		
39	MYBL2	[137]	[35]						[138]		
	COL1A1	[139]	[135]						[136]		
40	MYC							[38]			[39]
	E2F1							[36]			[37]

No	TF/Gene	BRCA	COAD	HNSC	KIRC	LGG	LUAD	PAAD	STAD	TGCT	THCA
41	NFKB1	[140]									[141]
	CHUK	[142]									?
42	NFKB1	[143]						[144]			
	MIF							[145]			
43	NFKB1							[144]			[141]
	NCAM1							[146]			[147]
44	NFKB2						[148]	[149]			
	HIF1A						[150]	[151]			
45	NFYB	[152]									[153]
	EDF1	[154]									?
46	NFYB	[152]									[153]
	HMGCS1	[155]									[156]
47	NFYB	[152]									[153]
	SP3	[157]									[158]
48	NR3C1	[159]									[160]
	CALD1	[161]									[162]
49	PARP1	[163]								[164]	
	FBN1	[161]								[165]	
50	PARP1	[163]	[166]								
	FN1	[167]	[168]								
51	POU2AF1	[169]						[170]			
	TK1	[171]						[172]			
52	POU2F1						[173]		[174]		
	VWF						[175]		[176]		
53	PPARA	[177]									[178]
	KLF11	[179]									[180]
54	RB1	[181]									[182]
	WRN	[183]									[184]
55	RELA							[185]			[186]
	BGN							[187]			?
56	RUNX1		[188]				[189]				[190]
	SYMPK		[191]				[192]				?
57	RUNX2	[193]									[194]
	MMP2	[195]									[196]
58	SNAI2	[66]		[197]							
	MET	[198]		[199]							
59	SOX18	[200]					[201]				
	CLDN5	[202]					[203]				
60	SOX9				[204]			[205]			
	CD3E				[206]			[207]			

No	TF/Gene	BRCA	COAD	HNSC	KIRC	LGG	LUAD	PAAD	STAD	TGCT	THCA
61	SP1						[208]				[209]
	ABCA2						[210]				[211]
62	SP1	[212]									[209]
	ADAM17	[213]									[214]
63	SP1	[212]									[209]
	ATM	[215]									[216]
64	SP1	[212]					[208]				[209]
	FLNA	[217]					[218]				[219]
65	SP1	[212]									[209]
	HRAS	[220]									[221]
66	SP1	[212]									[209]
	HSPB1	[9]									[222]
67	SP1	[212]					[208]				[209]
	ME1	[223]					[224]				?
68	SP1	[212]									[209]
	SIGIRR	[225]									?
69	SP1	[212]									[209]
	TGFBR2	[52]									[226]
70	SP1	[212]									[209]
	UTRN	[227]									[228]
71	SP3				[229]						[158]
	EDF1				?						?
72	SPI1							[187]			[230]
	ACP5							[231]			[232]
73	SPI1	[233]							[234]		
	CD40	[20]							[235]		
74	SPI1	[233]									[230]
	IL18	[236]									[237]
75	SPI1	[233]						[187]			
	NCF2	[238]						[239]			
76	STAT1	[240]									[241]
	CD40	[20]									[242]
77	STAT1	[240]									[241]
	FCGR1A	[243]									[244]
78	STAT1	[240]									[241]
	SERPING1	[245]									[246]
79	STAT1	[240]					[247]				
	TYMP	[248]					[249]				
80	STAT3	[250]									[251]
	AKAP12	[252]									[253]

No	TF/Gene	BRCA	COAD	HNSC	KIRC	LGG	LUAD	PAAD	STAD	TGCT	THCA
81	STAT3						[254]				[251]
	DNMT1						[255]				[256]
82	STAT3	[250]							[257]		
	IKBKE	[258]							[259]		
83	STAT3	[250]									[251]
	KLF11	[179]									[180]
84	STAT3	[250]									[251]
	NDUFA13	[260]									[261]
85	STAT3	[250]									[251]
	TYK2	[262]									[263]
86	TP53					[264]					[265]
	IGFBP3					[266]					[267]
87	TWIST2						[268]	[269]			
	SRPX						[270]	[271]			
88	USF1							?			[272]
	FMR1							[273]			[274]

Notes: '?' means having not found related evidences. There are 13 TFs/genes which have not evidences to support their relation to specific cancers. TF: Transcription Factor, BRCA: Breast invasive carcinoma, COAD: Colon adenocarcinoma, HNSC: Head and Neck squamous cell carcinoma, KIRC: Kidney renal clear cell carcinoma, LGG: Brain Lower Grade Glioma, LUAD: Lung adenocarcinoma, PAAD: Pancreatic adenocarcinoma, STAD: Stomach adenocarcinoma, TGCT: Testicular Germ Cell Tumors, THCA: Thyroid carcinoma.

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Table S4. miRNAs targeted by H19

miRNA	Description	Reference
let-7a	➢ The H19/let-7 double-negative feedback loop contributes to glucose metabolism in muscle cells. ➢ The imprinted H19 lncRNA antagonizes let-7 microRNAs. ➢ H19 lncRNA alters stromal cell growth via IGF signaling in the endometrium of women with endometriosis. ➢ Glycolysis gatekeeper PDK1 reprograms breast cancer stem cells under hypoxia.	[1] [2] [3] [4]
let-7b	➢ The imprinted H19 lncRNA antagonizes let-7 microRNAs. ➢ Glycolysis gatekeeper PDK1 reprograms breast cancer stem cells under hypoxia. ➢ The lncRNA H19 mediates breast cancer cell plasticity during EMT and MET plasticity by differentially sponging miR-200b/c and let-7b.	[2] [4] [5]
let-7g	➢ The imprinted H19 lncRNA antagonizes let-7 microRNAs. ➢ H19 lncRNA alters stromal cell growth via IGF signaling in the endometrium of women with endometriosis.	[2] [3]
let-7i	➢ H19/let-7/LIN28 reciprocal negative regulatory circuit promotes breast cancer stem cell maintenance.	[6]
miR-106a	➢ miR-CLIP capture of a miRNA targetome uncovers a lincRNA H19-miR-106a interaction.	[7]
miR-130b-3p	➢ H19 lncRNA regulates keratinocyte differentiation by targeting miR-130b-3p.	[8]
miR-138-5p	➢ Decreased Expression of MiR-138-5p by LncRNA H19 in Cervical Cancer Promotes Tumor Proliferation.	[9]
miR-139	➢ H19 lncRNA alters stromal cell growth via IGF signaling in the endometrium of women with endometriosis. ➢ Long Non-Coding RNA H19 Protects H9c2 Cells against Hypoxia-Induced Injury by Targeting MicroRNA-139.	[3] [10]
miR-141	➢ H19 activates Wnt signaling and promotes osteoblast differentiation by functioning as a competing endogenous RNA.	[11]
miR-152-3p	➢ Long non-coding RNA H19 promotes the proliferation and invasion of breast cancer through upregulating DNMT1 expression by sponging miR-152.	[12]
miR-152-5p	➢ Long non-coding RNA H19 promotes the proliferation and invasion of breast cancer through upregulating DNMT1 expression by sponging miR-152.	[12]
miR-17-5p	➢ Long noncoding RNA H19 competitively binds miR-17-5p to regulate YES1 expression in thyroid cancer. ➢ Long non-coding RNA H19 suppresses retinoblastoma progression	[13] [14]

		via counteracting miR-17-92 cluster.	
miR-181d-3p	➢	Hypoxia induces H19 expression through direct and indirect Hif-1α activity, promoting oncogenic effects in glioblastoma.	[15]
miR-181d-5p	➢	Hypoxia induces H19 expression through direct and indirect Hif-1α activity, promoting oncogenic effects in glioblastoma.	[15]
miR-18a	➢	Long non-coding RNA H19 suppresses retinoblastoma progression via counteracting miR-17-92 cluster.	[14]
miR-194-5p	➢	Long noncoding RNA H19 contributes to gallbladder cancer cell proliferation by modulated miR-194-5p targeting AKT2.	[16]
miR-196a	➢	The lncRNA H19 Mediates Pulmonary Fibrosis by Regulating the miR-196a/COL1A1 Axis.	[17]
miR-19a	➢	Long non-coding RNA H19 suppresses retinoblastoma progression via counteracting miR-17-92 cluster.	[14]
miR-19b-1	➢	Long non-coding RNA H19 suppresses retinoblastoma progression via counteracting miR-17-92 cluster.	[14]
miR-200b	➢	The lncRNA H19 mediates breast cancer cell plasticity during EMT and MET plasticity by differentially sponging miR-200b/c and let-7b.	[5]
miR-200c	➢	The lncRNA H19 mediates breast cancer cell plasticity during EMT and MET plasticity by differentially sponging miR-200b/c and let-7b.	[5]
miR-20a	➢	Long non-coding RNA H19 suppresses retinoblastoma progression via counteracting miR-17-92 cluster.	[14]
miR-22	➢	H19 activates Wnt signaling and promotes osteoblast differentiation by functioning as a competing endogenous RNA.	[11]
miR-29a	➢	Long non-coding RNA H19 regulates glioma angiogenesis and the biological behavior of glioma-associated endothelial cells by inhibiting microRNA-29a.	[18]
miR-29b	➢	Long noncoding RNA H19 accelerates tenogenic differentiation and promotes tendon healing through targeting miR-29b-3p and activating TGF-β1 signaling.	[19]
miR-342-3p	➢	Long non-coding RNA H19 regulates FOXM1 expression by competitively binding endogenous miR-342-3p in gallbladder cancer.	[20]
miR-630	➢	Long noncoding RNA H19 regulates EZH2 expression by interacting with miR-630 and promotes cell invasion in nasopharyngeal carcinoma.	[21]
miR-874	➢	LncRNA H19 functions as a competing endogenous RNA to regulate AQP3 expression by sponging miR-874 in the intestinal barrier.	[22]
miR-92a-1	➢	Long non-coding RNA H19 suppresses retinoblastoma progression via counteracting miR-17-92 cluster.	[14]

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Table S5. Regulation of 29 miRNAs in eight triplets.

H19-ETS1-TGFBR2

miRNAs	miR-106a	miR-130b-3p	miR-138-5p	miR-139	miR-141	miR-152-3p	miR-152-5p
Predicted targets of miRNAs							
TFs	RUNX1	FOSL2	EZH2	ETS1	CREBBP	KLF6	KLF6
	E2F1	MYB	POU2F1		POU2F1	KLF4	E2F3
	PPARA	STAT3	RELA				KLF4
	RB1		SP1				
	SP1						
	STAT3						
	KAT2B						
Genes	CALD1	FMR1	HIF1A	FMR1	FMR1	CHUK	DNMT1
	CCNG2	MET	KLF11	MAPK8		DNMT1	FBN1
	E2F1	TGFBR2		ZEB1		FBN1	FMR1
	HIF1A					FMR1	SOS1
	SMAD4					SOS1	
	MMP2						
	MAPK8						
	SOS1						
	TGFBR2						
	KLF11						
	TXNIP						
Validated targets of miRNAs							
TFs	E2F1	AHR	EZH2	NFKB1	E2F3	KLF4	
	MYB	E2F1	NFKB1		PPARA		
	RB1	NR3C1	SNAI2		HDGF		
	RUNX1	PPARA	SOX9				
	STAT3	RB1	TWIST2				
		STAT3					
Genes	E2F1	E2F1	HIF1A	HRAS	ZEB1	DNMT1	
	FAS	KLF11	SNAI2	MET	EIF4E	ADAM17	
	TGFBR2	SMAD4			KLF11		
	ATM	TGFBR2			ZEB1		
	HIF1A	ZEB1					
		FMR1					
		MMP2					

Notes: In the H19-ETS1-TGFBR2 sheet, we list all the 29 miRNAs and their targets (TFs and genes). Some of the targets were predicted and then verified. In the H19-ETS1-TGFBR2 table, TFs are marked in yellow if miRNAs target them, and genes are marked in red if miRNAs target them.

miRNAs	miR-17	miR-181d-3p	miR-181d-5p	miR-18a	miR-194-5p	miR-196a	miR-19a
Predicted targets of miRNAs							
TFs	RUNX1		RUNX1	RUNX1	E2F3	ERG	
	E2F1		KLF6	KLF6	FLI1	FLI1	
	RB1		ETS1	NR3C1	SP3		
	STAT3		NR3C1	POU2F1			
	KAT2B		KAT2B				
Genes	CALD1		ATM	ATM	ACP5	FAS	FMR1
	CCNG2		SOS1	CTGF	FMR1	COL1A1	IL18
	E2F1		VCAM1	HIF1A	SP3	MAPK8	
	HIF1A		EPB41L3	HMGCS1	RSF1	ZEB1	
	MMP2			MAPK8			
	SOS1						
	TGFBR2						
	KLF11						
	TXNIP						
Validated targets of miRNAs							
TFs	E2F1			NR3C1	FOXM1	FOXO1	KAT2B
	E2F3			RUNX1			
	KAT2B						
	MYC						
	RB1						
	RUNX1						
	STAT3						
Genes	E2F1		HRAS	CTGF		FLNA	CTGF
	MMP2			EDF1		TGFBR2	SMAD4
	MYC			ATM			TGFBR2
	SMAD4			HIF1A			DNMT1
	TGFBR2			HMGCS1			
	HIF1A			SMAD4			
	DNMT1			TGFBR2			
	IGFBP3			DNMT1			

miRNAs	miR-19b-1	miR-200b	miR-200c	miR-20a	miR-22	miR-29a	miR-29b
Predicted targets of miRNAs							
TFs		KLF6		E2F1	FOXO1	ETS1	MYBL2
		SP3		E2F3	HNRNPK	KAT2B	
				EZH2			
				PPARA			
				RB1			
				STAT3			
				KAT2B			
Genes		NCF2		CALD1	CD68		DNMT1
		MAPK8		CCNG2	SOS1		FBN1
		SP3		E2F1	UTRN		EDF1
				HIF1A	VCAM1		
				SMAD4	WRN		
				MMP2			
				MAPK8			
				SOS1			
				TGFBR2			
				KLF11			
				TXNIP			

Validated targets of miRNAs							
TFs	KAT2B	E2F3	MYB	E2F1	PPARA	KLF4	SP1
	NR3C1	ETS1	ETS1	E2F3		AHR	STAT3
		MYB	SP1	MYC		MYC	SP1
		SP1	E2F3	RB1			STAT3
		EZH2	FOXO1	RUNX1			MYC
			E2F3	STAT3			
Genes	CTGF	CREB1	FLNA	CCNB1	HIF1A	MMP2	COL1A1
	FMR1	FN1	FN1	E2F1		DNMT1	DNMT1
	ATM	KLF11	KLF11	FLNA		FBN1	MMP2
	HMGCS1	ZEB1	ZEB1	HIF1A		MYC	FBN1
	SMAD4	DNMT1	NCAM1	MYC			MYC
	TGFBR2		CYP1B1	SMAD4			
	DNMT1			TGFBR2			
				DNMT1			

miRNAs	miR-342-3p	miR-630	miR-874	miR-92a-1	let-7a	let-7b	let-7g
Predicted targets of miRNAs							
TFs	E2F3	KLF6	POU2F1		EZH2	EZH2	EZH2
		EZH2	STAT3		POU2F1	POU2F1	POU2F1
					RB1	RB1	RB1
					TP53	TP53	TP53
Genes	DNMT1		FBN1	COL1A1	FAS	FAS	FAS
	ZEB1		FMR1	DACT3	COL1A1	COL1A1	COL1A1
			SIGIRR		IL6	IL6	IL6
					MAPK8	MAPK8	MAPK8
					UTRN	UTRN	UTRN
Validated targets of miRNAs							
TFs	FOSL2	SNAI2	PARP1	HDAC1	E2F1	CTCF	MYC
	E2F1	FOXM1	HDAC1	HDGF	EZH2	E2F3	
			STAT3	KAT2B	MYC	EZH2	
			E2F3	MYBL2	NFKB1	MYC	
				NFKB1	PARP1	SOX9	
				STAT3	SP1	SP1	
				HDAC2	STAT3		
				KLF4			
				IKZF1			
Genes	DNMT1	SNAI2		ATM	MYC	BIRC5	MYC
	E2F1			CCNB1	HRAS	CCNB1	FN1
				EPB41L3	E2F1	EPB41L3	
				FLNA	IL6	FLNA	
				HMGCS1		HIF1A	
				SMAD4		HMGCS1	
				TGFBR2		MYC	
				TYMP		UTRN	
				MAPK8		HRAS	
				DNMT1			

miRNAs	let-7i
Predicted targets of miRNAs	
TFs	EZH2
	POU2F1
	RB1
	TP53
Genes	FAS
	CHUK
	COL1A1
	IL6
	MAPK8
	UTRN
Validated targets of miRNAs	
TFs	
Genes	

H19-FLI1-TGFBR2

miRNAs	miR-106a	miR-130b-3p	miR-138-5p	miR-139	miR-141	miR-152-3p	miR-152-5p	miR-17

Predicted targets of miRNAs

TFs	RUNX1	FOSL2	EZH2	ETS1	CREBBP	KLF6	KLF6	RUNX1
	E2F1	MYB	POU2F1		POU2F1	KLF4	E2F3	E2F1
	PPARA	STAT3	RELA				KLF4	RB1
	RB1		SP1					STAT3
	SP1							KAT2B
	STAT3							
	KAT2B							
Genes	CALD1	FMR1	HIF1A	FMR1	FMR1	CHUK	DNMT1	CALD1
	CCNG2	MET	KLF11	MAPK8		DNMT1	FBN1	CCNG2
	E2F1	TGFBR2		ZEB1		FBN1	FMR1	E2F1
	HIF1A					FMR1	SOS1	HIF1A
	SMAD4					SOS1		MMP2
	MMP2							SOS1
	MAPK8							TGFBR2
	SOS1							KLF11
	TGFBR2							TXNIP
	KLF11							
	TXNIP							

Validated targets of miRNAs

TFs	E2F1	AHR	EZH2	NFKB1	E2F3	KLF4		E2F1
	MYB	E2F1	NFKB1		PPARA			E2F3
	RB1	NR3C1	SNAI2		HDGF			KAT2B
	RUNX1	PPARA	SOX9					MYC
	STAT3	RB1	TWIST2					RB1
		STAT3						RUNX1
								STAT3
Genes	E2F1	E2F1	HIF1A	HRAS	ZEB1	DNMT1		E2F1
	FAS	KLF11	SNAI2	MET	EIF4E	ADAM17		MMP2
	TGFBR2	SMAD4			KLF11			MYC
	ATM	TGFBR2			ZEB1			SMAD4
	HIF1A	ZEB1						TGFBR2
		FMR1						HIF1A
		MMP2						DNMT1
								IGFBP3

miRNAs	miR-181d-3p	miR-181d-5p	miR-18a	miR-194-5p	miR-196a	miR-19a	miR-19b-1	miR-200b
Predicted targets of miRNAs								
TFs		RUNX1	RUNX1	E2F3	ERG			KLF6
		KLF6	KLF6	FLI1	FLI1			SP3
		ETS1	NR3C1	SP3				
		NR3C1	POU2F1					
		KAT2B						
Genes		ATM	ATM	ACP5	FAS	FMR1		NCF2
		SOS1	CTGF	FMR1	COL1A1	IL18		MAPK8
		VCAM1	HIF1A	SP3	MAPK8			SP3
		EPB41L3	HMGCS1	RSF1	ZEB1			
			MAPK8					
Validated targets of miRNAs								
TFs			NR3C1	FOXM1	FOXO1	KAT2B	KAT2B	E2F3
			RUNX1				NR3C1	ETS1
								MYB
								SP1
								EZH2
Genes		HRAS	CTGF		FLNA	CTGF	CTGF	CREB1
			EDF1		TGFBR2	SMAD4	FMR1	FN1
			ATM			TGFBR2	ATM	KLF11
			HIF1A			DNMT1	HMGCS1	ZEB1
			HMGCS1				SMAD4	DNMT1
			SMAD4				TGFBR2	
			TGFBR2				DNMT1	
			DNMT1					

miRNAs	miR-200c	miR-20a	miR-22	miR-29a	miR-29b	miR-342-3p	miR-630	miR-874

Predicted targets of miRNAs

TFs		E2F1	FOXO1	ETS1	MYBL2	E2F3	KLF6	POU2F1
		E2F3	HNRNPK	KAT2B			EZH2	STAT3
		EZH2						
		PPARA						
		RB1						
		STAT3						
		KAT2B						
Genes		CALD1	CD68		DNMT1	DNMT1		FBN1
		CCNG2	SOS1		FBN1	ZEB1		FMR1
		E2F1	UTRN		EDF1			SIGIRR
		HIF1A	VCAM1					
		SMAD4	WRN					
		MMP2						
		MAPK8						
		SOS1						
		TGFBR2						
		KLF11						
		TXNIP						

Validated targets of miRNAs

TFs	MYB	E2F1	PPARA	KLF4	SP1	FOSL2	SNAI2	PARP1
	ETS1	E2F3		AHR	STAT3	E2F1	FOXM1	HDAC1
	SP1	MYC		MYC	SP1			STAT3
	E2F3	RB1			STAT3			E2F3
	FOXO1	RUNX1			MYC			
	E2F3	STAT3						
Genes	FLNA	CCNB1	HIF1A	MMP2	COL1A1	DNMT1	SNAI2	
	FN1	E2F1		DNMT1	DNMT1	E2F1		
	KLF11	FLNA		FBN1	MMP2			
	ZEB1	HIF1A		MYC	FBN1			
	NCAM1	MYC			MYC			
	CYP1B1	SMAD4						
		TGFBR2						
		DNMT1						

miRNAs	miR-92a-1	let-7a	let-7b	let-7g	let-7i
Predicted targets of miRNAs					
TFs		EZH2	EZH2	EZH2	EZH2
		POU2F1	POU2F1	POU2F1	POU2F1
		RB1	RB1	RB1	RB1
		TP53	TP53	TP53	TP53
Genes	COL1A1	FAS	FAS	FAS	FAS
	DACT3	COL1A1	COL1A1	COL1A1	CHUK
		IL6	IL6	IL6	COL1A1
		MAPK8	MAPK8	MAPK8	IL6
		UTRN	UTRN	UTRN	MAPK8
					UTRN
Validated targets of miRNAs					
TFs	HDAC1	E2F1	CTCF	MYC	
	HDGF	EZH2	E2F3		
	KAT2B	MYC	EZH2		
	MYBL2	NFKB1	MYC		
	NFKB1	PARP1	SOX9		
	STAT3	SP1	SP1		
	HDAC2	STAT3			
	KLF4				
	IKZF1				
Genes	ATM	MYC	BIRC5	MYC	
	CCNB1	HRAS	CCNB1	FN1	
	EPB41L3	E2F1	EPB41L3		
	FLNA	IL6	FLNA		
	HMGCS1		HIF1A		
	SMAD4		HMGCS1		
	TGFBR2		MYC		
	TYMP		UTRN		
	MAPK8		HRAS		
	DNMT1				

H19-FOXO1-TXNIP

miRNAs	miR-106a	miR-130b-3p	miR-138-5p	miR-139	miR-141	miR-152-3p	miR-152-5p

Predicted targets of miRNAs

TFs	RUNX1	FOSL2	EZH2	ETS1	CREBBP	KLF6	KLF6
	E2F1	MYB	POU2F1		POU2F1	KLF4	E2F3
	PPARA	STAT3	RELA				KLF4
	RB1		SP1				
	SP1						
	STAT3						
	KAT2B						
Genes	CALD1	FMR1	HIF1A	FMR1	FMR1	CHUK	DNMT1
	CCNG2	MET	KLF11	MAPK8		DNMT1	FBN1
	E2F1	TGFBR2		ZEB1		FBN1	FMR1
	HIF1A					FMR1	SOS1
	SMAD4					SOS1	
	MMP2						
	MAPK8						
	SOS1						
	TGFBR2						
	KLF11						
	TXNIP						

Validated targets of miRNAs

TFs	E2F1	AHR	EZH2	NFKB1	E2F3	KLF4	
	MYB	E2F1	NFKB1		PPARA		
	RB1	NR3C1	SNAI2		HDGF		
	RUNX1	PPARA	SOX9				
	STAT3	RB1	TWIST2				
		STAT3					
Genes	E2F1	E2F1	HIF1A	HRAS	ZEB1	DNMT1	
	FAS	KLF11	SNAI2	MET	EIF4E	ADAM17	
	TGFBR2	SMAD4			KLF11		
	ATM	TGFBR2			ZEB1		
	HIF1A	ZEB1					
		FMR1					
		MMP2					

miRNAs	miR-17	miR-181d-3p	miR-181d-5p	miR-18a	miR-194-5p	miR-196a	miR-19a

Predicted targets of miRNAs

TFs	RUNX1		RUNX1	RUNX1	E2F3	ERG	
	E2F1		KLF6	KLF6	FLI1	FLI1	
	RB1		ETS1	NR3C1	SP3		
	STAT3		NR3C1	POU2F1			
	KAT2B		KAT2B				
Genes	CALD1		ATM	ATM	ACP5	FAS	FMR1
	CCNG2		SOS1	CTGF	FMR1	COL1A1	IL18
	E2F1		VCAM1	HIF1A	SP3	MAPK8	
	HIF1A		EPB41L3	HMGCS1	RSF1	ZEB1	
	MMP2			MAPK8			
	SOS1						
	TGFBR2						
	KLF11						
	TXNIP						

Validated targets of miRNAs

TFs	E2F1			NR3C1	FOXM1	FOXO1	KAT2B
	E2F3			RUNX1			
	KAT2B						
	MYC						
	RB1						
	RUNX1						
	STAT3						
Genes	E2F1		HRAS	CTGF		FLNA	CTGF
	MMP2			EDF1		TGFBR2	SMAD4
	MYC			ATM			TGFBR2
	SMAD4			HIF1A			DNMT1
	TGFBR2			HMGCS1			
	HIF1A			SMAD4			
	DNMT1			TGFBR2			
	IGFBP3			DNMT1			

miRNAs	miR-19b-1	miR-200b	miR-200c	miR-20a	miR-22	miR-29a	miR-29b
Predicted targets of miRNAs							
TFs		KLF6		E2F1	FOXO1	ETS1	MYBL2
		SP3		E2F3	HNRNPK	KAT2B	
				EZH2			
				PPARA			
				RB1			
				STAT3			
				KAT2B			
Genes		NCF2		CALD1	CD68		DNMT1
		MAPK8		CCNG2	SOS1		FBN1
		SP3		E2F1	UTRN		EDF1
				HIF1A	VCAM1		
				SMAD4	WRN		
				MMP2			
				MAPK8			
				SOS1			
				TGFBR2			
				KLF11			
				TXNIP			
Validated targets of miRNAs							
TFs	KAT2B	E2F3	MYB	E2F1	PPARA	KLF4	SP1
	NR3C1	ETS1	ETS1	E2F3		AHR	STAT3
		MYB	SP1	MYC		MYC	SP1
		SP1	E2F3	RB1			STAT3
		EZH2	FOXO1	RUNX1			MYC
			E2F3	STAT3			
Genes	CTGF	CREB1	FLNA	CCNB1	HIF1A	MMP2	COL1A1
	FMR1	FN1	FN1	E2F1		DNMT1	DNMT1
	ATM	KLF11	KLF11	FLNA		FBN1	MMP2
	HMGCS1	ZEB1	ZEB1	HIF1A		MYC	FBN1
	SMAD4	DNMT1	NCAM1	MYC			MYC
	TGFBR2		CYP1B1	SMAD4			
	DNMT1			TGFBR2			
				DNMT1			

miRNAs	miR-342-3p	miR-630	miR-874	miR-92a-1	let-7a	let-7b	let-7g
Predicted targets of miRNAs							
TFs	E2F3	KLF6	POU2F1		EZH2	EZH2	EZH2
		EZH2	STAT3		POU2F1	POU2F1	POU2F1
					RB1	RB1	RB1
					TP53	TP53	TP53
Genes	DNMT1		FBN1	COL1A1	FAS	FAS	FAS
	ZEB1		FMR1	DACT3	COL1A1	COL1A1	COL1A1
			SIGIRR		IL6	IL6	IL6
					MAPK8	MAPK8	MAPK8
					UTRN	UTRN	UTRN
Validated targets of miRNAs							
TFs	FOSL2	SNAI2	PARP1	HDAC1	E2F1	CTCF	MYC
	E2F1	FOXM1	HDAC1	HDGF	EZH2	E2F3	
			STAT3	KAT2B	MYC	EZH2	
			E2F3	MYBL2	NFKB1	MYC	
				NFKB1	PARP1	SOX9	
				STAT3	SP1	SP1	
				HDAC2	STAT3		
				KLF4			
				IKZF1			
Genes	DNMT1	SNAI2		ATM	MYC	BIRC5	MYC
	E2F1			CCNB1	HRAS	CCNB1	FN1
				EPB41L3	E2F1	EPB41L3	
				FLNA	IL6	FLNA	
				HMGCS1		HIF1A	
				SMAD4		HMGCS1	
				TGFBR2		MYC	
				TYMP		UTRN	
				MAPK8		HRAS	
				DNMT1			

miRNAs	let-7i

Predicted targets of miRNAs

TFs	EZH2
	POU2F1
	RB1
	TP53
Genes	FAS
	CHUK
	COL1A1
	IL6
	MAPK8
	UTRN

Validated targets of miRNAs

TFs	
Genes	

H19-KLF6-TXNIP

miRNAs	miR-106a	miR-130b-3p	miR-138-5p	miR-139	miR-141	miR-152-3p	miR-152-5p
Predicted targets of miRNAs							
TFs	RUNX1	FOSL2	EZH2	ETS1	CREBBP	KLF6	KLF6
	E2F1	MYB	POU2F1		POU2F1	KLF4	E2F3
	PPARA	STAT3	RELA				KLF4
	RB1		SP1				
	SP1						
	STAT3						
	KAT2B						
Genes	CALD1	FMR1	HIF1A	FMR1	FMR1	CHUK	DNMT1
	CCNG2	MET	KLF11	MAPK8		DNMT1	FBN1
	E2F1	TGFBR2		ZEB1		FBN1	FMR1
	HIF1A					FMR1	SOS1
	SMAD4					SOS1	
	MMP2						
	MAPK8						
	SOS1						
	TGFBR2						
	KLF11						
	TXNIP						

Validated targets of miRNAs

TFs	E2F1	AHR	EZH2	NFKB1	E2F3	KLF4	
	MYB	E2F1	NFKB1		PPARA		
	RB1	NR3C1	SNAI2		HDGF		
	RUNX1	PPARA	SOX9		KLF6????		
	STAT3	RB1	TWIST2				
		STAT3					
Genes	E2F1	E2F1	HIF1A	HRAS	ZEB1	DNMT1	
	FAS	KLF11	SNAI2	MET	EIF4E	ADAM17	
	TGFBR2	SMAD4			KLF11		
	ATM	TGFBR2			ZEB1		
	HIF1A	ZEB1					
		FMR1					
		MMP2					

miRNAs	miR-17	miR-181d-3p	miR-181d-5p	miR-18a	miR-194-5p	miR-196a	miR-19a

Predicted targets of miRNAs

TFs	RUNX1		RUNX1	RUNX1	E2F3	ERG	
	E2F1		KLF6	KLF6	FLI1	FLI1	
	RB1		ETS1	NR3C1	SP3		
	STAT3		NR3C1	POU2F1			
	KAT2B		KAT2B				
Genes	CALD1		ATM	ATM	ACP5	FAS	FMR1
	CCNG2		SOS1	CTGF	FMR1	COL1A1	IL18
	E2F1		VCAM1	HIF1A	SP3	MAPK8	
	HIF1A		EPB41L3	HMGCS1	RSF1	ZEB1	
	MMP2			MAPK8			
	SOS1						
	TGFBR2						
	KLF11						
	TXNIP						

Validated targets of miRNAs

TFs	E2F1			NR3C1	FOXM1	FOXO1	KAT2B
	E2F3			RUNX1			
	KAT2B						
	MYC						
	RB1						
	RUNX1						
	STAT3						
Genes	E2F1		HRAS	CTGF		FLNA	CTGF
	MMP2			EDF1		TGFBR2	SMAD4
	MYC			ATM			TGFBR2
	SMAD4			HIF1A			DNMT1
	TGFBR2			HMGCS1			
	HIF1A			SMAD4			
	DNMT1			TGFBR2			
	IGFBP3			DNMT1			

miRNAs	miR-19b-1	miR-200b	miR-200c	miR-20a	miR-22	miR-29a	miR-29b

Predicted targets of miRNAs

TFs		KLF6		E2F1	FOXO1	ETS1	MYBL2
		SP3		E2F3	HNRNPK	KAT2B	
				EZH2			
				PPARA			
				RB1			
				STAT3			
				KAT2B			
Genes		NCF2		CALD1	CD68		DNMT1
		MAPK8		CCNG2	SOS1		FBN1
		SP3		E2F1	UTRN		EDF1
				HIF1A	VCAM1		
				SMAD4	WRN		
				MMP2			
				MAPK8			
				SOS1			
				TGFBR2			
				KLF11			
				TXNIP			

Validated targets of miRNAs

TFs	KAT2B	E2F3	MYB	E2F1	PPARA	KLF4	SP1
	NR3C1	ETS1	ETS1	E2F3		AHR	STAT3
		MYB	SP1	MYC		MYC	SP1
		SP1	E2F3	RB1			STAT3
		EZH2	FOXO1	RUNX1			MYC
			E2F3	STAT3			
Genes	CTGF	CREB1	FLNA	CCNB1	HIF1A	MMP2	COL1A1
	FMR1	FN1	FN1	E2F1		DNMT1	DNMT1
	ATM	KLF11	KLF11	FLNA		FBN1	MMP2
	HMGCS1	ZEB1	ZEB1	HIF1A		MYC	FBN1
	SMAD4	DNMT1	NCAM1	MYC			MYC
	TGFBR2		CYP1B1	SMAD4			
	DNMT1			TGFBR2			
				DNMT1			

miRNAs	miR-342-3p	miR-630	miR-874	miR-92a-1	let-7a	let-7b	let-7g
Predicted targets of miRNAs							
TFs	E2F3	KLF6	POU2F1		EZH2	EZH2	EZH2
		EZH2	STAT3		POU2F1	POU2F1	POU2F1
					RB1	RB1	RB1
					TP53	TP53	TP53
Genes	DNMT1		FBN1	COL1A1	FAS	FAS	FAS
	ZEB1		FMR1	DACT3	COL1A1	COL1A1	COL1A1
			SIGIRR		IL6	IL6	IL6
					MAPK8	MAPK8	MAPK8
					UTRN	UTRN	UTRN
Validated targets of miRNAs							
TFs	FOSL2	SNAI2	PARP1	HDAC1	E2F1	CTCF	MYC
	E2F1	FOXM1	HDAC1	HDGF	EZH2	E2F3	
			STAT3	KAT2B	MYC	EZH2	
			E2F3	MYBL2	NFKB1	MYC	
				NFKB1	PARP1	SOX9	
				STAT3	SP1	SP1	
				HDAC2	STAT3		
				KLF4			
				IKZF1			
Genes	DNMT1	SNAI2		ATM	MYC	BIRC5	MYC
	E2F1			CCNB1	HRAS	CCNB1	FN1
				EPB41L3	E2F1	EPB41L3	
				FLNA	IL6	FLNA	
				HMGCS1		HIF1A	
				SMAD4		HMGCS1	
				TGFBR2		MYC	
				TYMP		UTRN	
				MAPK8		HRAS	
				DNMT1			

miRNAs	let-7i

Predicted targets of miRNAs

TFs	EZH2
	POU2F1
	RB1
	TP53
Genes	FAS
	CHUK
	COL1A1
	IL6
	MAPK8
	UTRN

Validated targets of miRNAs

TFs	
Genes	

H19-PPARA-KLF11

miRNAs	miR-106a	miR-130b-3p	miR-138-5p	miR-139	miR-141	miR-152-3p	miR-152-5p
Predicted targets of miRNAs							
TFs	RUNX1	FOSL2	EZH2	ETS1	CREBBP	KLF6	KLF6
	E2F1	MYB	POU2F1		POU2F1	KLF4	E2F3
	PPARA	STAT3	RELA				KLF4
	RB1		SP1				
	SP1						
	STAT3						
	KAT2B						
Genes	CALD1	FMR1	HIF1A	FMR1	FMR1	CHUK	DNMT1
	CCNG2	MET	KLF11	MAPK8		DNMT1	FBN1
	E2F1	TGFBR2		ZEB1		FBN1	FMR1
	HIF1A					FMR1	SOS1
	SMAD4					SOS1	
	MMP2						
	MAPK8						
	SOS1						
	TGFBR2						
	KLF11						
	TXNIP						
Validated targets of miRNAs							
TFs	E2F1	AHR	EZH2	NFKB1	E2F3	KLF4	
	MYB	E2F1	NFKB1		PPARA		
	RB1	NR3C1	SNAI2		HDGF		
	RUNX1	PPARA	SOX9				
	STAT3	RB1	TWIST2				
		STAT3					
Genes	E2F1	E2F1	HIF1A	HRAS	ZEB1	DNMT1	
	FAS	KLF11	SNAI2	MET	EIF4E	ADAM17	
	TGFBR2	SMAD4			KLF11		
	ATM	TGFBR2			ZEB1		
	HIF1A	ZEB1					
		FMR1					
		MMP2					

miRNAs	miR-17	miR-181d-3p	miR-181d-5p	miR-18a	miR-194-5p	miR-196a	miR-19a
Predicted targets of miRNAs							
TFs	RUNX1		RUNX1	RUNX1	E2F3	ERG	
	E2F1		KLF6	KLF6	FLI1	FLI1	
	RB1		ETS1	NR3C1	SP3		
	STAT3		NR3C1	POU2F1			
	KAT2B		KAT2B				
Genes	CALD1		ATM	ATM	ACP5	FAS	FMR1
	CCNG2		SOS1	CTGF	FMR1	COL1A1	IL18
	E2F1		VCAM1	HIF1A	SP3	MAPK8	
	HIF1A		EPB41L3	HMGCS1	RSF1	ZEB1	
	MMP2			MAPK8			
	SOS1						
	TGFBR2						
	KLF11						
	TXNIP						
Validated targets of miRNAs							
TFs	E2F1			NR3C1	FOXM1	FOXO1	KAT2B
	E2F3			RUNX1			
	KAT2B						
	MYC						
	RB1						
	RUNX1						
	STAT3						
Genes	E2F1		HRAS	CTGF		FLNA	CTGF
	MMP2			EDF1		TGFBR2	SMAD4
	MYC			ATM			TGFBR2
	SMAD4			HIF1A			DNMT1
	TGFBR2			HMGCS1			
	HIF1A			SMAD4			
	DNMT1			TGFBR2			
	IGFBP3			DNMT1			

miRNAs	miR-19b-1	miR-200b	miR-200c	miR-20a	miR-22	miR-29a	miR-29b
Predicted targets of miRNAs							
TFs		KLF6		E2F1	FOXO1	ETS1	MYBL2
		SP3		E2F3	HNRNPK	KAT2B	
				EZH2			
				PPARA			
				RB1			
				STAT3			
				KAT2B			
Genes		NCF2		CALD1	CD68		DNMT1
		MAPK8		CCNG2	SOS1		FBN1
		SP3		E2F1	UTRN		EDF1
				HIF1A	VCAM1		
				SMAD4	WRN		
				MMP2			
				MAPK8			
				SOS1			
				TGFBR2			
				KLF11			
				TXNIP			
Validated targets of miRNAs							
TFs	KAT2B	E2F3	MYB	E2F1	PPARA	KLF4	SP1
	NR3C1	ETS1	ETS1	E2F3		AHR	STAT3
		MYB	SP1	MYC		MYC	SP1
		SP1	E2F3	RB1			STAT3
		EZH2	FOXO1	RUNX1			MYC
			E2F3	STAT3			
Genes	CTGF	CREB1	FLNA	CCNB1	HIF1A	MMP2	COL1A1
	FMR1	FN1	FN1	E2F1		DNMT1	DNMT1
	ATM	KLF11	KLF11	FLNA		FBN1	MMP2
	HMGCS1	ZEB1	ZEB1	HIF1A		MYC	FBN1
	SMAD4	DNMT1	NCAM1	MYC			MYC
	TGFBR2		CYP1B1	SMAD4			
	DNMT1			TGFBR2			
				DNMT1			

miRNAs	miR-342-3p	miR-630	miR-874	miR-92a-1	let-7a	let-7b	let-7g

Predicted targets of miRNAs

TFs	E2F3	KLF6	POU2F1		EZH2	EZH2	EZH2
		EZH2	STAT3		POU2F1	POU2F1	POU2F1
					RB1	RB1	RB1
					TP53	TP53	TP53
Genes	DNMT1		FBN1	COL1A1	FAS	FAS	FAS
	ZEB1		FMR1	DACT3	COL1A1	COL1A1	COL1A1
			SIGIRR		IL6	IL6	IL6
					MAPK8	MAPK8	MAPK8
					UTRN	UTRN	UTRN

Validated targets of miRNAs

TFs	FOSL2	SNAI2	PARP1	HDAC1	E2F1	CTCF	MYC
	E2F1	FOXM1	HDAC1	HDGF	EZH2	E2F3	
			STAT3	KAT2B	MYC	EZH2	
			E2F3	MYBL2	NFKB1	MYC	
				NFKB1	PARP1	SOX9	
				STAT3	SP1	SP1	
				HDAC2	STAT3		
				KLF4			
				IKZF1			
Genes	DNMT1	SNAI2		ATM	MYC	BIRC5	MYC
	E2F1			CCNB1	HRAS	CCNB1	FN1
				EPB41L3	E2F1	EPB41L3	
				FLNA	IL6	FLNA	
				HMGCS1		HIF1A	
				SMAD4		HMGCS1	
				TGFBR2		MYC	
				TYMP		UTRN	
				MAPK8		HRAS	
				DNMT1			

miRNAs	let-7i

Predicted targets of miRNAs

TFs	EZH2
	POU2F1
	RB1
	TP53
Genes	FAS
	CHUK
	COL1A1
	IL6
	MAPK8
	UTRN

Validated targets of miRNAs

TFs	
Genes	

H19-SP1-TGFBR2

miRNAs	miR-106a	miR-130b-3p	miR-138-5p	miR-139	miR-141	miR-152-3p	miR-152-5p
Predicted targets of miRNAs							
TFs	RUNX1	FOSL2	EZH2	ETS1	CREBBP	KLF6	KLF6
	E2F1	MYB	POU2F1		POU2F1	KLF4	E2F3
	PPARA	STAT3	RELA				KLF4
	RB1		SP1				
	SP1						
	STAT3						
	KAT2B						
Genes	CALD1	FMR1	HIF1A	FMR1	FMR1	CHUK	DNMT1
	CCNG2	MET	KLF11	MAPK8		DNMT1	FBN1
	E2F1	TGFBR2		ZEB1		FBN1	FMR1
	HIF1A					FMR1	SOS1
	SMAD4					SOS1	
	MMP2						
	MAPK8						
	SOS1						
	TGFBR2						
	KLF11						
	TXNIP						

Validated targets of miRNAs

TFs	E2F1	AHR	EZH2	NFKB1	E2F3	KLF4	
	MYB	E2F1	NFKB1		PPARA		
	RB1	NR3C1	SNAI2		HDGF		
	RUNX1	PPARA	SOX9				
	STAT3	RB1	TWIST2				
		STAT3					
Genes	E2F1	E2F1	HIF1A	HRAS	ZEB1	DNMT1	
	FAS	KLF11	SNAI2	MET	EIF4E	ADAM17	
	TGFBR2	SMAD4			KLF11		
	ATM	TGFBR2			ZEB1		
	HIF1A	ZEB1					
		FMR1					
		MMP2					

miRNAs	miR-17	miR-181d-3p	miR-181d-5p	miR-18a	miR-194-5p	miR-196a	miR-19a
Predicted targets of miRNAs							
TFs	RUNX1		RUNX1	RUNX1	E2F3	ERG	
	E2F1		KLF6	KLF6	FLI1	FLI1	
	RB1		ETS1	NR3C1	SP3		
	STAT3		NR3C1	POU2F1			
	KAT2B		KAT2B				
Genes	CALD1		ATM	ATM	ACP5	FAS	FMR1
	CCNG2		SOS1	CTGF	FMR1	COL1A1	IL18
	E2F1		VCAM1	HIF1A	SP3	MAPK8	
	HIF1A		EPB41L3	HMGCS1	RSF1	ZEB1	
	MMP2			MAPK8			
	SOS1						
	TGFBR2						
	KLF11						
	TXNIP						
Validated targets of miRNAs							
TFs	E2F1			NR3C1	FOXM1	FOXO1	KAT2B
	E2F3			RUNX1			
	KAT2B						
	MYC						
	RB1						
	RUNX1						
	STAT3						
Genes	E2F1		HRAS	CTGF		FLNA	CTGF
	MMP2			EDF1		TGFBR2	SMAD4
	MYC			ATM			TGFBR2
	SMAD4			HIF1A			DNMT1
	TGFBR2			HMGCS1			
	HIF1A			SMAD4			
	DNMT1			TGFBR2			
	IGFBP3			DNMT1			

miRNAs	miR-19b-1	miR-200b	miR-200c	miR-20a	miR-22	miR-29a	miR-29b
Predicted targets of miRNAs							
TFs		KLF6		E2F1	FOXO1	ETS1	MYBL2
		SP3		E2F3	HNRNPK	KAT2B	
				EZH2			
				PPARA			
				RB1			
				STAT3			
				KAT2B			
Genes		NCF2		CALD1	CD68		DNMT1
		MAPK8		CCNG2	SOS1		FBN1
		SP3		E2F1	UTRN		EDF1
				HIF1A	VCAM1		
				SMAD4	WRN		
				MMP2			
				MAPK8			
				SOS1			
				TGFBR2			
				KLF11			
				TXNIP			
Validated targets of miRNAs							
TFs	KAT2B	E2F3	MYB	E2F1	PPARA	KLF4	SP1
	NR3C1	ETS1	ETS1	E2F3		AHR	STAT3
		MYB	SP1	MYC		MYC	SP1
		SP1	E2F3	RB1			STAT3
		EZH2	FOXO1	RUNX1			MYC
			E2F3	STAT3			
Genes	CTGF	CREB1	FLNA	CCNB1	HIF1A	MMP2	COL1A1
	FMR1	FN1	FN1	E2F1		DNMT1	DNMT1
	ATM	KLF11	KLF11	FLNA		FBN1	MMP2
	HMGCS1	ZEB1	ZEB1	HIF1A		MYC	FBN1
	SMAD4	DNMT1	NCAM1	MYC			MYC
	TGFBR2		CYP1B1	SMAD4			
	DNMT1			TGFBR2			
				DNMT1			

miRNAs	miR-342-3p	miR-630	miR-874	miR-92a-1	let-7a	let-7b	let-7g
Predicted targets of miRNAs							
TFs	E2F3	KLF6	POU2F1		EZH2	EZH2	EZH2
		EZH2	STAT3		POU2F1	POU2F1	POU2F1
					RB1	RB1	RB1
					TP53	TP53	TP53
Genes	DNMT1		FBN1	COL1A1	FAS	FAS	FAS
	ZEB1		FMR1	DACT3	COL1A1	COL1A1	COL1A1
			SIGIRR		IL6	IL6	IL6
					MAPK8	MAPK8	MAPK8
					UTRN	UTRN	UTRN
Validated targets of miRNAs							
TFs	FOSL2	SNAI2	PARP1	HDAC1	E2F1	CTCF	MYC
	E2F1	FOXM1	HDAC1	HDGF	EZH2	E2F3	
			STAT3	KAT2B	MYC	EZH2	
			E2F3	MYBL2	NFKB1	MYC	
				NFKB1	PARP1	SOX9	
				STAT3	SP1	SP1	
				HDAC2	STAT3		
				KLF4			
				IKZF1			
Genes	DNMT1	SNAI2		ATM	MYC	BIRC5	MYC
	E2F1			CCNB1	HRAS	CCNB1	FN1
				EPB41L3	E2F1	EPB41L3	
				FLNA	IL6	FLNA	
				HMGCS1		HIF1A	
				SMAD4		HMGCS1	
				TGFBR2		MYC	
				TYMP		UTRN	
				MAPK8		HRAS	
				DNMT1			

miRNAs	let-7i

Predicted targets of miRNAs

TFs	EZH2
	POU2F1
	RB1
	TP53
Genes	FAS
	CHUK
	COL1A1
	IL6
	MAPK8
	UTRN

Validated targets of miRNAs

TFs	
Genes	

H19-STAT3-KLF11

miRNAs	miR-106a	miR-130b-3p	miR-138-5p	miR-139	miR-141	miR-152-3p	miR-152-5p	miR-17
Predicted targets of miRNAs								
TFs	RUNX1	FOSL2	EZH2	ETS1	CREBBP	KLF6	KLF6	RUNX1
	E2F1	MYB	POU2F1		POU2F1	KLF4	E2F3	E2F1
	PPARA	STAT3	RELA				KLF4	RB1
	RB1		SP1					STAT3
	SP1							KAT2B
	STAT3							
	KAT2B							
Genes	CALD1	FMR1	HIF1A	FMR1	FMR1	CHUK	DNMT1	CALD1
	CCNG2	MET	KLF11	MAPK8		DNMT1	FBN1	CCNG2
	E2F1	TGFBR2		ZEB1		FBN1	FMR1	E2F1
	HIF1A					FMR1	SOS1	HIF1A
	SMAD4					SOS1		MMP2
	MMP2							SOS1
	MAPK8							TGFBR2
	SOS1							KLF11
	TGFBR2							TXNIP
	KLF11							
	TXNIP							
Validated targets of miRNAs								
TFs	E2F1	AHR	EZH2	NFKB1	E2F3	KLF4		E2F1
	MYB	E2F1	NFKB1		PPARA			E2F3
	RB1	NR3C1	SNAI2		HDGF			KAT2B
	RUNX1	PPARA	SOX9					MYC
	STAT3	RB1	TWIST2					RB1
		STAT3						RUNX1
								STAT3
Genes	E2F1	E2F1	HIF1A	HRAS	ZEB1	DNMT1		E2F1
	FAS	KLF11	SNAI2	MET	EIF4E	ADAM17		MMP2
	TGFBR2	SMAD4			KLF11			MYC
	ATM	TGFBR2			ZEB1			SMAD4
	HIF1A	ZEB1						TGFBR2
		FMR1						HIF1A
		MMP2						DNMT1
								IGFBP3

miRNAs	miR-181d-3p	miR-181d-5p	miR-18a	miR-194-5p	miR-196a	miR-19a	miR-19b-1
Predicted targets of miRNAs							
TFs		RUNX1	RUNX1	E2F3	ERG		
		KLF6	KLF6	FLI1	FLI1		
		ETS1	NR3C1	SP3			
		NR3C1	POU2F1				
		KAT2B					
Genes		ATM	ATM	ACP5	FAS	FMR1	
		SOS1	CTGF	FMR1	COL1A1	IL18	
		VCAM1	HIF1A	SP3	MAPK8		
		EPB41L3	HMGCS1	RSF1	ZEB1		
			MAPK8				

Validated targets of miRNAs

TFs			NR3C1	FOXM1	FOXO1	KAT2B	KAT2B
			RUNX1				NR3C1
Genes		HRAS	CTGF		FLNA	CTGF	CTGF
			EDF1		TGFBR2	SMAD4	FMR1
			ATM			TGFBR2	ATM
			HIF1A			DNMT1	HMGCS1
			HMGCS1				SMAD4
			SMAD4				TGFBR2
			TGFBR2				DNMT1
			DNMT1				

miRNAs	miR-200b	miR-200c	miR-20a	miR-22	miR-29a	miR-29b	miR-342-3p

Predicted targets of miRNAs

TFs	KLF6		E2F1	FOXO1	ETS1	MYBL2	E2F3
	SP3		E2F3	HNRNPK	KAT2B		
			EZH2				
			PPARA				
			RB1				
			STAT3				
			KAT2B				
Genes	NCF2		CALD1	CD68		DNMT1	DNMT1
	MAPK8		CCNG2	SOS1		FBN1	ZEB1
	SP3		E2F1	UTRN		EDF1	
			HIF1A	VCAM1			
			SMAD4	WRN			
			MMP2				
			MAPK8				
			SOS1				
			TGFBR2				
			KLF11				
			TXNIP				

Validated targets of miRNAs

TFs	E2F3	MYB	E2F1	PPARA	KLF4	SP1	FOSL2
	ETS1	ETS1	E2F3		AHR	STAT3	E2F1
	MYB	SP1	MYC		MYC	SP1	
	SP1	E2F3	RB1			STAT3	
	EZH2	FOXO1	RUNX1			MYC	
		E2F3	STAT3				
Genes	CREB1	FLNA	CCNB1	HIF1A	MMP2	COL1A1	DNMT1
	FN1	FN1	E2F1		DNMT1	DNMT1	E2F1
	KLF11	KLF11	FLNA		FBN1	MMP2	
	ZEB1	ZEB1	HIF1A		MYC	FBN1	
	DNMT1	NCAM1	MYC			MYC	
		CYP1B1	SMAD4				
			TGFBR2				
			DNMT1				

miRNAs	miR-630	miR-874	miR-92a-1	let-7a	let-7b	let-7g	let-7i
Predicted targets of miRNAs							
TFs	KLF6	POU2F1		EZH2	EZH2	EZH2	EZH2
	EZH2	STAT3		POU2F1	POU2F1	POU2F1	POU2F1
				RB1	RB1	RB1	RB1
				TP53	TP53	TP53	TP53
Genes		FBN1	COL1A1	FAS	FAS	FAS	FAS
		FMR1	DACT3	COL1A1	COL1A1	COL1A1	CHUK
		SIGIRR		IL6	IL6	IL6	COL1A1
				MAPK8	MAPK8	MAPK8	IL6
				UTRN	UTRN	UTRN	MAPK8
							UTRN
Validated targets of miRNAs							
TFs	SNAI2	PARP1	HDAC1	E2F1	CTCF	MYC	
	FOXM1	HDAC1	HDGF	EZH2	E2F3		
		STAT3	KAT2B	MYC	EZH2		
		E2F3	MYBL2	NFKB1	MYC		
			NFKB1	PARP1	SOX9		
			STAT3	SP1	SP1		
			HDAC2	STAT3			
			KLF4				
			IKZF1				
Genes	SNAI2		ATM	MYC	BIRC5	MYC	
			CCNB1	HRAS	CCNB1	FN1	
			EPB41L3	E2F1	EPB41L3		
			FLNA	IL6	FLNA		
			HMGCS1		HIF1A		
			SMAD4		HMGCS1		
			TGFBR2		MYC		
			TYMP		UTRN		
			MAPK8		HRAS		
			DNMT1				

H19-NFYB-SP3

miRNAs	miR-106a	miR-130b-3p	miR-138-5p	miR-139	miR-141	miR-152-3p	miR-152-5p
Predicted targets of miRNAs							
TFs	RUNX1	FOSL2	EZH2	ETS1	CREBBP	KLF6	KLF6
	E2F1	MYB	POU2F1		POU2F1	KLF4	E2F3
	PPARA	STAT3	RELA				KLF4
	RB1		SP1				
	SP1						
	STAT3						
	KAT2B						
Genes	CALD1	FMR1	HIF1A	FMR1	FMR1	CHUK	DNMT1
	CCNG2	MET	KLF11	MAPK8		DNMT1	FBN1
	E2F1	TGFBR2		ZEB1		FBN1	FMR1
	HIF1A					FMR1	SOS1
	SMAD4					SOS1	
	MMP2						
	MAPK8						
	SOS1						
	TGFBR2						
	KLF11						
	TXNIP						

targets of miRNAs

TFs	E2F1	AHR	EZH2	NFKB1	E2F3	KLF4	
	MYB	E2F1	NFKB1		PPARA		
	RB1	NR3C1	SNAI2		HDGF		
	RUNX1	PPARA	SOX9				
	STAT3	RB1	TWIST2				
		STAT3					
Genes	E2F1	E2F1	HIF1A	HRAS	ZEB1	DNMT1	
	FAS	KLF11	SNAI2	MET	EIF4E	ADAM17	
	TGFBR2	SMAD4			KLF11		
	ATM	TGFBR2			ZEB1		
	HIF1A	ZEB1					
		FMR1					
		MMP2					

miRNAs	miR-17	miR-181d-3p	miR-181d-5p	miR-18a	miR-194-5p	miR-196a	miR-19a
Predicted targets of miRNAs							
TFs	RUNX1		RUNX1	RUNX1	E2F3	ERG	
	E2F1		KLF6	KLF6	FLI1	FLI1	
	RB1		ETS1	NR3C1	SP3		
	STAT3		NR3C1	POU2F1			
	KAT2B		KAT2B				
Genes	CALD1		ATM	ATM	ACP5	FAS	FMR1
	CCNG2		SOS1	CTGF	FMR1	COL1A1	IL18
	E2F1		VCAM1	HIF1A	SP3	MAPK8	
	HIF1A		EPB41L3	HMGCS1	RSF1	ZEB1	
	MMP2			MAPK8			
	SOS1						
	TGFBR2						
	KLF11						
	TXNIP						
targets of miRNAs							
TFs	E2F1			NR3C1	FOXM1	FOXO1	KAT2B
	E2F3			RUNX1			
	KAT2B						
	MYC						
	RB1						
	RUNX1						
	STAT3						
Genes	E2F1		HRAS	CTGF		FLNA	CTGF
	MMP2			EDF1		TGFBR2	SMAD4
	MYC			ATM			TGFBR2
	SMAD4			HIF1A			DNMT1
	TGFBR2			HMGCS1			
	HIF1A			SMAD4			
	DNMT1			TGFBR2			
	IGFBP3			DNMT1			

miRNAs	miR-19b-1	miR-200b	miR-200c	miR-20a	miR-22	miR-29a	miR-29b
Predicted targets of miRNAs							
TFs		KLF6		E2F1	FOXO1	ETS1	MYBL2
		SP3		E2F3	HNRNPK	KAT2B	
				EZH2			
				PPARA			
				RB1			
				STAT3			
				KAT2B			
Genes		NCF2		CALD1	CD68		DNMT1
		MAPK8		CCNG2	SOS1		FBN1
		SP3		E2F1	UTRN		EDF1
				HIF1A	VCAM1		
				SMAD4	WRN		
				MMP2			
				MAPK8			
				SOS1			
				TGFBR2			
				KLF11			
				TXNIP			
targets of miRNAs							
TFs	KAT2B	E2F3	MYB	E2F1	PPARA	KLF4	SP1
	NR3C1	ETS1	ETS1	E2F3		AHR	STAT3
		MYB	SP1	MYC		MYC	SP1
		SP1	E2F3	RB1			STAT3
		EZH2	FOXO1	RUNX1			MYC
			E2F3	STAT3			
Genes	CTGF	CREB1	FLNA	CCNB1	HIF1A	MMP2	COL1A1
	FMR1	FN1	FN1	E2F1		DNMT1	DNMT1
	ATM	KLF11	KLF11	FLNA		FBN1	MMP2
	HMGCS1	ZEB1	ZEB1	HIF1A		MYC	FBN1
	SMAD4	DNMT1	NCAM1	MYC			MYC
	TGFBR2		CYP1B1	SMAD4			
	DNMT1			TGFBR2			
				DNMT1			

miRNAs	miR-342-3p	miR-630	miR-874	miR-92a-1	let-7a	let-7b	let-7g
Predicted targets of miRNAs							
TFs	E2F3	KLF6	POU2F1		EZH2	EZH2	EZH2
		EZH2	STAT3		POU2F1	POU2F1	POU2F1
					RB1	RB1	RB1
					TP53	TP53	TP53
Genes	DNMT1		FBN1	COL1A1	FAS	FAS	FAS
	ZEB1		FMR1	DACT3	COL1A1	COL1A1	COL1A1
			SIGIRR		IL6	IL6	IL6
					MAPK8	MAPK8	MAPK8
					UTRN	UTRN	UTRN

targets of miRNAs							
TFs	FOSL2	SNAI2	PARP1	HDAC1	E2F1	CTCF	MYC
	E2F1	FOXM1	HDAC1	HDGF	EZH2	E2F3	
			STAT3	KAT2B	MYC	EZH2	
			E2F3	MYBL2	NFKB1	MYC	
				NFKB1	PARP1	SOX9	
				STAT3	SP1	SP1	
				HDAC2	STAT3		
				KLF4			
				IKZF1			
Genes	DNMT1	SNAI2		ATM	MYC	BIRC5	MYC
	E2F1			CCNB1	HRAS	CCNB1	FN1
				EPB41L3	E2F1	EPB41L3	
				FLNA	IL6	FLNA	
				HMGCS1		HIF1A	
				SMAD4		HMGCS1	
				TGFBR2		MYC	
				TYMP		UTRN	
				MAPK8		HRAS	
				DNMT1			

miRNAs	let-7i
Predicted targets of miRNAs	
TFs	EZH2
	POU2F1
	RB1
	TP53
Genes	FAS
	CHUK
	COL1A1
	IL6
	MAPK8
	UTRN

targets of miRNAs	
TFs	
Genes	

Table S6. Primers for qRT-PCR experiment

Gene	Forward sequence	Reverse sequence
GAPDH	5'-CCACTCCTCCACCTTTGAC-3'	5'-ACCCTGTTGCTGTAGCCA-3'
H19	5'-GTGGACTTGGTGACGCTGTA-3'	5'-CACCATCCTCCCTCCTGAGA-3'
SP1	5'-TGGCAGCAGTACCAATGGC-3'	5'-CCAGGTAGTCCTGTCAGAACTT-3'
ETS1	5'-GATAGTTGTGATCGCCTCACC-3'	5'-GTCCTCTGAGTCGAAGCTGTC-3'
STAT3	5'-ACCAGCAGTATAGCCGCTTC-3'	5'-GCCACAATCCGGGCAATCT-3'
TGFBR2	5'-GTAGCTCTGATGAGTGCAATGAC-3'	5'-CAGATATGGCAACTCCCAGTG-3'
KLF11	5'-GTTGCGGATAAGACCCCTCAC-3'	5'-TGGAATCTGTTACTTGGGGAGA-3'