Supplemental Tables

**Supplementary Table 1.** Leukemia cell lines.

| #  | Cell line   | Histological subtype | Gene fusion                     | Gender, Age |
|----|-------------|-----------------------|---------------------------------|-------------|
| 1  | K562        | CML                   | **BCR-ABL1**                    | f, 53       |
| 2  | HL60/S4     | AML                   | --                              | f, 35       |
| 3  | KASUMI6     | AML, M2 type          | --                              | m, 64       |
| 4  | KASUMI1     | AML                   | **t(8;21) AML1-CBF2T1**         | m, 7        |
| 5  | SKNO1       | AML, M2 type          | **t(8;21) AML1-CBF2T1**         | m, 22       |
| 6  | SEM         | pre B- ALL            | MLL-AF4                         | f, 5        |
| 7  | TANOUUE     | pre B- ALL            | **IGH@-MYC**                    | m, 11       |
| 8  | REH         | pre B- ALL            | **ETV6-AML1**                   | f, 15       |
| 9  | NALM6       | pre B- ALL            | --                              | m, 19       |
| 10 | 697(EU-3)   | pre B- ALL            | **TCF3(E2A)-PBX1, M7**          | m, 12       |
| 11 | CEM3        | T-cell ALL            | --                              | f, 3        |
| 12 | MOLT4       | T-cell ALL            | --                              | m, 19       |
| 13 | MOLT16      | T-cell ALL            | **TRA@-MYC**                    | f, 5        |
**Supplementary Table 2. Antibodies.**

| Gene Name | Company       | Catalog #                  | IgG Type                      | Dilution, (technique*) |
|-----------|---------------|----------------------------|-------------------------------|------------------------|
| CD34-APC* | Miltenyi Biotech | 130-098-139/130-113-738    | Mouse IgG2a                   | 1:50 (FC)              |
| CD38-PE*  | Miltenyi Biotech | 130-110-344/130-117-829    | Recombinant human IgG1        | 1:50 (FC)              |
| CD19-PE*  | Miltenyi Biotech | 130-110-350/130-114-172    | Recombinant human IgG1        | 1:50 (FC)              |
| CD3-PE*   | Miltenyi Biotech | 130-109-540/130-113-701    | Recombinant human IgG1        | 1:50 (FC)              |
| CD11b-PE  | Miltenyi Biotech | 130-110-553                | Recombinant human IgG1        | 1:50 (FC)              |
| CD11b-PE  | BioLegend      | 301306                     | Mouse IgG1, κ                 | 1:20 (FC)              |
| IgG1k-PE  | BioLegend      | 400112                     | Mouse IgG, κ ctrl             | 1:20 (FC)              |
| REA Ctrl(S)-PE | Miltenyi Biotech | 130-113-438       | Recombinant human IgG1 ctrl   | 1:50 (FC)              |
| IgG-APC*  | Miltenyi Biotech | 130-091-835/130-113-272    | Mouse IgG2a ctrl              | 1:50 (FC)              |
| IGF2BP1   | Cell Signaling Technologies | 8482S       | Rabbit                        | 1:1000 (WB)            |
| IGF2BP2   | MBL            | RN008P                      | Rabbit                        | 1:1000 (WB)            |
| IGF2BP3   | MBL            | RN009P                      | Rabbit                        | 1:1000 (WB)            |
| ALDH1A1   | Cell Signaling Technologies | 12035S         | Rabbit                        | 1:1000 (WB)            |
| ALDH1A1   | Novus Biologicals | NBP2-15336     | Rabbit                        | 1:1000 (WB)            |
| HOXB4     | Invitrogen     | PA5-23366                   | Rabbit                        | 1:1000 (WB)            |
| HOXB4     | Novus Biologicals | NBP2-24561     | Rabbit                        | 1:1000 (WB)            |
| MYB       | Cell Signaling Technologies | 12319S         | Rabbit                        | 1:1000 (WB)            |
| beta-actin | Cell Signaling Technologies | 4970S         | Rabbit                        | 1:2000 (WB)            |
| HRP-linked anti-rabbit | Cell Signaling Technologies | 7074S         | Goat                          | 1:2000 (WB)            |

*FC- Flow cytometry, WB- Western blotting.*

*Previous catalog number/Current catalog number*
**Supplementary Table 3.** Short hairpin (sh) RNA-expressing vectors used for gene silencing.

| Construct Name | Insert (targeting site) | Plasmid Name | Catalog# | Company |
|----------------|--------------------------|--------------|----------|---------|
| shIGF2BP1 (SH1) | ACGCTTAGAGATTGAACATT (coding region of IGF2BP1) | MISSION® pLKO.1-puro | TRCN0000218079; | Sigma |
| shIGF2BP1 (SH2) | TTCCTTGCCAATGAGACGC (coding region of IGF2BP1) | SMARTvector Inducible TurboGFP shRNA | V3SH11252-227953809 | Dharmacon |
| shIGF2BP1 (SH3) | AAAATACATCGTTCCCTCT (3'UTR of IGF2BP1) | SMARTvector Inducible TurboGFP shRNA | V3SH11252-228438084 | Dharmacon |
| shIGF2BP3 | CGGTGAATGAACTTCAGAATT (coding region of IGF2BP3) | MISSION® pLKO.1-puro TRCN0000074675 | Sigma |
| shControl | Targets no known mammalian genes | MISSION® pLKO.1-puro | SHC002 | Sigma |
| shControl | Non-targeting control | SMARTvector Inducible Non-targeting Control 1 | VSC11653 | Dharmacon |
**Supplementary Table 4.** Plasmids for genes’ overexpression.

| Construct Name                  | Insert        | Plasmid Name       | Catalog#       | Company                      |
|---------------------------------|---------------|--------------------|----------------|------------------------------|
| gfp (nucleofection control)     | YP_002302326.1| pmaxGFP            | included in the kit V4XP-3012 | Lonza                        |
| gfp (lentiviral control)        | YP_002302326.1| pLV-IFE1a-IRES-Puro | #85132         | Addgene (Dr. Meyer lab)      |
| gfp (inducible lentiviral control) | YP_002302326.1| pINDUCER20         | #44012         | Addgene (Dr. Stephen Elledge, lab) |
| Empty vector control            | n/a           | pReceiver-Lv105    | EX-NEG-Lv105   | GeneCopoeia                  |
| IGF2BP1                         | NM_006546.4   | pLKO,hIMP1_3G      | n/a            | Dr. Joel Yisraeli lab        |
|                                 | NM_006546.4   | pINDUCER20         | #44012         | Addgene (Dr. Stephen Elledge, lab) |
| ALDH1A1                         | NM_000689.5   | pcDNA3-HA-ADH      | 11610          | Addgene (Dr. Steven Johnson lab) |
|                                 | NM_000689.4   | pReceiver-Lv105    | EX-U0011-Lv105 | GeneCopoeia                  |
| HOXB4                           | NM_024015.5   | MSCV-humanHoxB4-IRES-YFP | 91889         | Addgene (Dr. Brian Sorrentino lab) |
|                                 | NM_024015.4   | pReceiver-Lv105    | EX-T1370-Lv105 | GeneCopoeia                  |
| MYB                             | NM_001130173.1| pReceiver-Lv105    | EX-H3756-Lv105 | GeneCopoeia                  |
**Supplementary Table 5.** Chemical compounds.

| Chemical Name                                | CAS #          | Company            | Catalog #          | Solvent | Stock Concentration |
|----------------------------------------------|----------------|--------------------|--------------------|---------|---------------------|
| Doxycycline, Hyclate                         | 24390-14-5    | Stemgent Millipore | 04-0016 324385-1gm | water   | 5mg/ml              |
| All-trans retinoic acid (ATRA)               | 302-79-4      | Sigma              | R2625              | DMSO    | 100 mM              |
| BTYNB                                        | 304456-62-0   | Cayman Chemical    | 25623              | DMSO    | 100 mM              |
| Doxorubicin hydrochloride                    | 25316-40-9    | Tocris             | 2252               | water   | 50 mM               |
| Cytarabine                                   | 147-94-4      | Tocris             | 4520               | water   | 50 mM               |
| 4-hydroperoxy-cyclophosphamide (4-OOH-CY)    | 39800-16-3    | Cayman Chemical    | 19527              | chloroform | 100 mM           |
**Supplementary Table 6.** Primers for qPCR.

| Gene Name          | Fwd                          | Rev                          |
|--------------------|------------------------------|------------------------------|
| ABCA2              | AGATGGACAAGATGATCGAG         | GCTTGTACTTCAGGATGAG          |
| ABCB1              | GAGGAAGACATGACCCAGGTA        | CTGTCGCGATTATAGCATGAA        |
| ABCG2              | ACTTGAAGGGCATTACTGAA         | TCTTCCCTTGAGCTGAAGG          |
| ALDH1A1            | TGTTAGCTATGCGACTTGA          | TCTTTAGCCGGCTCAACTG          |
| ALDH1A2            | TGATCTCCAGTTGCGTTGGA         | TGAATCGGTCTTGAGGCACTC        |
| AML1-ETO (RUNX1-CBF2T1) | ATGACCTCAGGTGTTGCGTTG       | TGAATCGGTCTTGAGGCACTC        |
| AML1-ETO (RUNX1-CBF2T1) | GGCTGGCAATGAGTTTCAAAGCTC   | CGCCATTCAAGGCTGAGG           |
| CD34               | ACCAGAAGGTATTCAAAAGACC      | TGCGGCGATTCATCGAGGAAT        |
| DNM1b              | ACCTCGTGTTGAGGGAAGATCA      | CATCGCCAAACCAACCTGGA         |
| HOXB4              | CGTGAGCGAAGTGTTAACC         | CGAGCGGATCTTTGTTG            |
| HOXB9              | CCATTCTTGGAGCCTTCAAGG       | TGTAAAGGCTGGAGCAGGGGGAG      |
| IGF2BP1 FL         | TGAAGGGCCATGCAACTTCTTCA     | GATTTGAATTCTTCCGCTCTTTG      |
| IGF2BP1 total      | GACCCCTGATGGAGACGCA         | TGTAACTCTGGCTCCTTCTGA        |
| LAPTM4B            | GCGCAGGAGGAGGAGAGGATAG      | CAACAGTGACCACACCTATGGATGA    |
| MLL-AF4            | CACTTACTAGAGGGCGGCCAA       | GGTTGTCTTCTGCTGACTG          |
| MLL-AF4            | ACAGAAAAAGTGCGCTCCCAGC      | GCAACCCCAGGCTGCTGTTA         |
| MMRN1              | GCTGAGGGGAGGAGGGAAGAGA      | TGTAAAGGCTGGAGCAGGGGGAG      |
| RPL13A             | CCTGAGGAGGAGGAGGGAAGA       | TGTAACTCTGGCTCCTTCTGA        |
| RPL13A             | CGGACCCTGGAGGATAG           | CACCACCTGGGTTTCTGCTT         |
| RPS18              | ATCCACATTGCAGAAATCCAGC      | GACCTGCGAGGATTTTCTCATC       |
| TCF3-PBX1          | CACCCGACCTGCAGCCAAAC        | TCGCAGGAGATTCTGACCG          |
| TCF3-PBX1          | CAGGACCGCCCTGAGGTTG         | GAGTTGCTGAGCGATCGCT          |
| TBP                | CCAGAACCGCGAATATTAATC       | AATCAGTGCGGTGTGTC            |

| Gene Name   | Bio-Rad ID   | Bio-Rad ID |
|-------------|--------------|------------|
| ABCB1       | qHsaCEP0058075 | n/a        |
| ABCC1       | qHsaCID0016624 | n/a        |
| ALDH1A1     | qHsaCID0018574 | n/a        |
| ALDH1A3     | qHsaCED0047566 | n/a        |
| CEBPA       | qHsaCED0048815 | n/a        |
| HOXB4       | qHsaCED0047548 | n/a        |
| HOXB9       | qHsaCID0008079 | n/a        |
| IGF2BP1     | qHsaCID0010743 | n/a        |
| IGF2BP2     | qHsaCED0036334 | n/a        |
| IGF2BP3     | qHsaCED0004904 | n/a        |
| MYB         | qHsaCED0043781 | n/a        |
| MYC         | qHsaCID0012921 | n/a        |
| RPS18       | qHsaCED0037454 | n/a        |