**Supplemental Figure and Table Legends**

**Figure S1.** SOX4 protein expression in Lin-CD34+EML and Lin-CD34-EML cells. Western blot shows SOX4 protein expression level is higher in Lin-CD34+EML cells compared with Lin-CD34-EML cells.

**Table S1.** List of proteins identified by MS.

**Table S2.** Transcription factor binding motifs enriched in Lin-CD34+EML open chromatin regions.

**Table S3.** ATAC-Seq peaks and ChIP-Seq peaks within the top 50 differentially expressed genes.

**Table S4.** Combined list of ChIP-Seq targets of TCF7, RUNX1, STAT3, and SOX4 with NCBI protein-protein interactions in mouse. SOX4 and STAT3 ChIP-Seq peaks were filtered according to FDR <0.05 and enrichment >10. TCF7 and RUNX1 ChIP-Seq peaks were obtained from the results of our previous research3. Genes were filtered leaving only those with RPKM >1 in at least one of the samples and expression fold-change >1.5 (up- or downregulated).

**Table S5:** Graph-based clustering of genes from inferred regulatory network and gene-set enrichment. Gene-sets were considered enriched if FDR < 0.001, p-value < 0.00001, and number of genes > 10.

**Table S6:** Real-time PCR and ATAC-SeqPrimerSequences.