Supplemental Data

Supplemental Figure 1. General feature of ATAC-Seq analysis.

Supplemental Figure 2. Calculated 'Open probability (P_o)' for regulatory regions within insulated loops.

Supplemental Figure 3. Changes of complement of minimum Bayes' factor (MBF) upon different noise values within the *Faim2-Aqp2-Aqp5* insulated loop.

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Supplemental Figure 6. Interactive network of genes (transcription factors, kinases and transporters) with C/EBPβ-binding sites on their promoter or gene body.

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Supplemental Table 1. Functional annotations of C/EBPβ-bound genes

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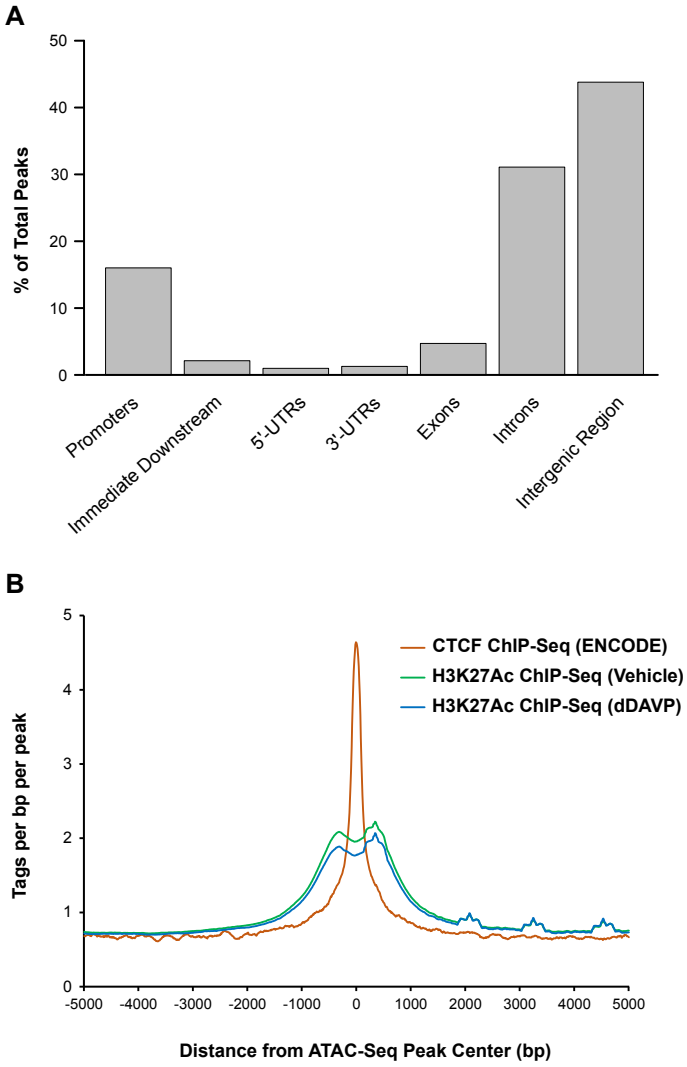
Supplemental Dataset 1. Transcription factors expressed in mpkCCD cells

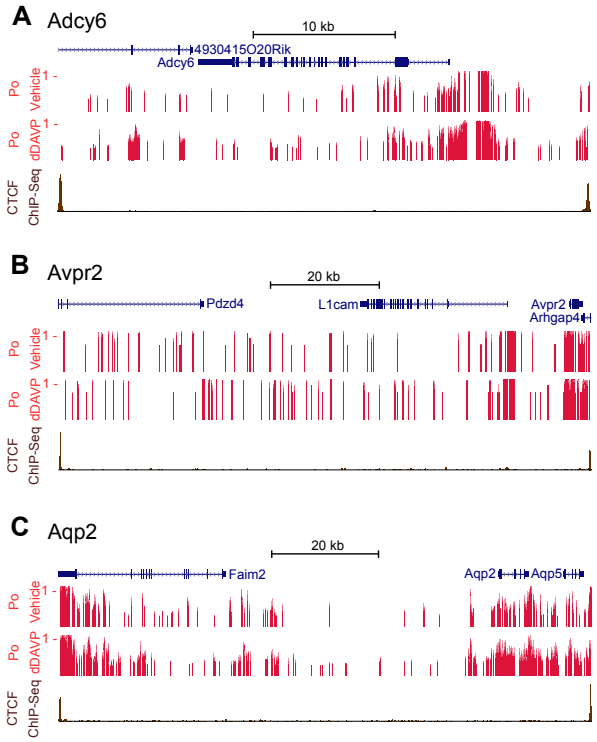
Full Methods

Supplemental Figure 1



Supplemental Figure 1. *General feature of ATAC-Seq analysis.* (A) Locations of ATAC-Seq peaks relative to nearest gene. The majority of ATAC-Seq peaks were found within the introns of genes and intergenic regions. (B) Histogram of the distribution of ChIP-Seq signals (CTCF ChIP-Seq and H3K27Ac ChIP-Seq) near ATAC-Seq peaks. Signals from ChIP-Seq were evaluated within 5 kb upstream to 5 kb downstream of ATAC-Seq peak center was calculated using *HOMER*.

Supplemental Figure 2

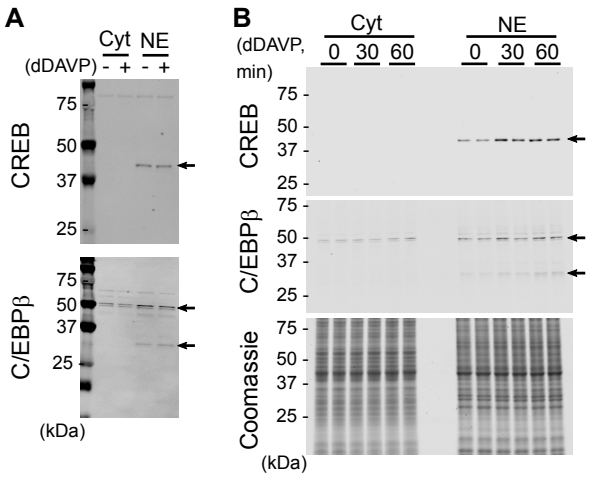


Supplemental Figure 2. *Calculated 'Open probability (P_o)' for regulatory regions within insulated loops.* (A) CTCF loop including *Adcy6* gene. (B) CTCF loop including *Avpr2* gene. (C) CTCF loop including *Aqp2* gene. The P_o values were calculated using 1× Median value as a noise value.

Supplemental Figure 3

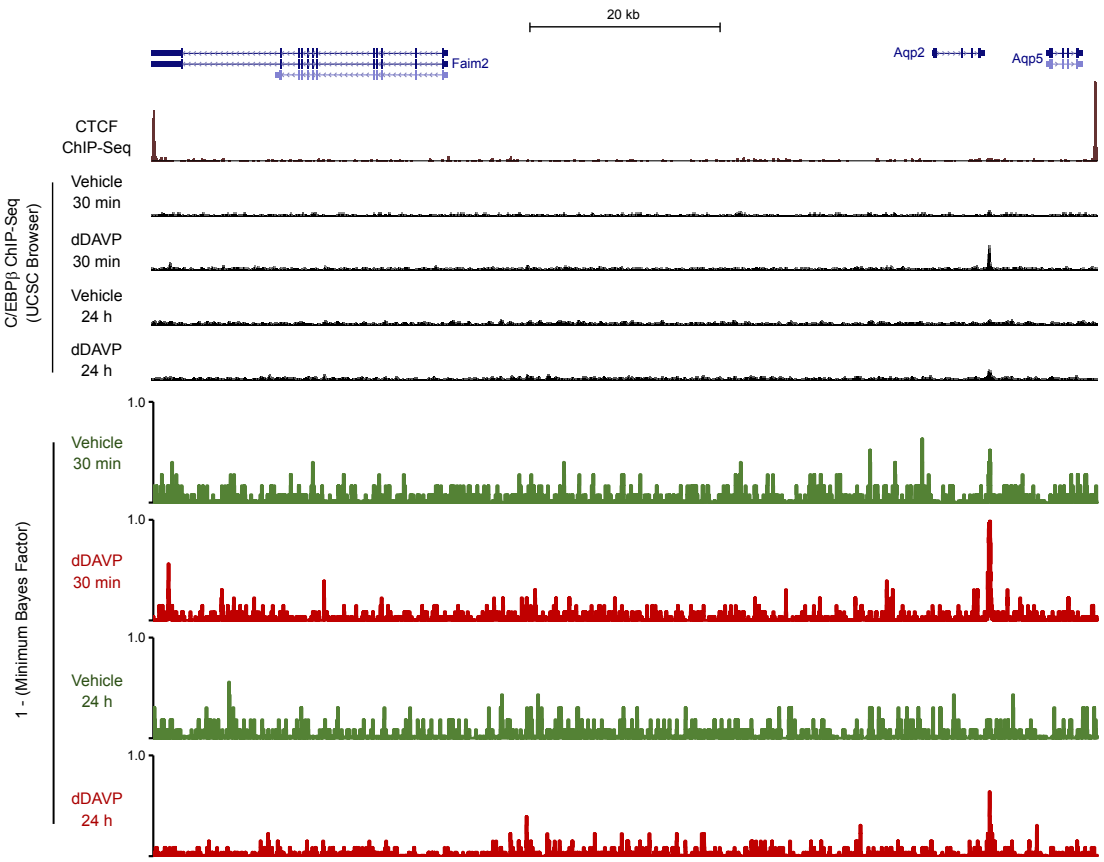
Supplemental Figure 3. *Changes of complement of minimum Bayes' factor (MBF) upon different noise values within the Faim2-Aqp2-Aqp5 insulated loop.* Open probability (P_o) by multiplying 3 independent MBF complements were shown as the complement of the MBF in red plots. MBF changes of each experiment by multiple tests using different noise values (1X-5X median) were shown in individual plots (green plots). "Complement of MBF" is 1-MBF

Supplemental Figure 4



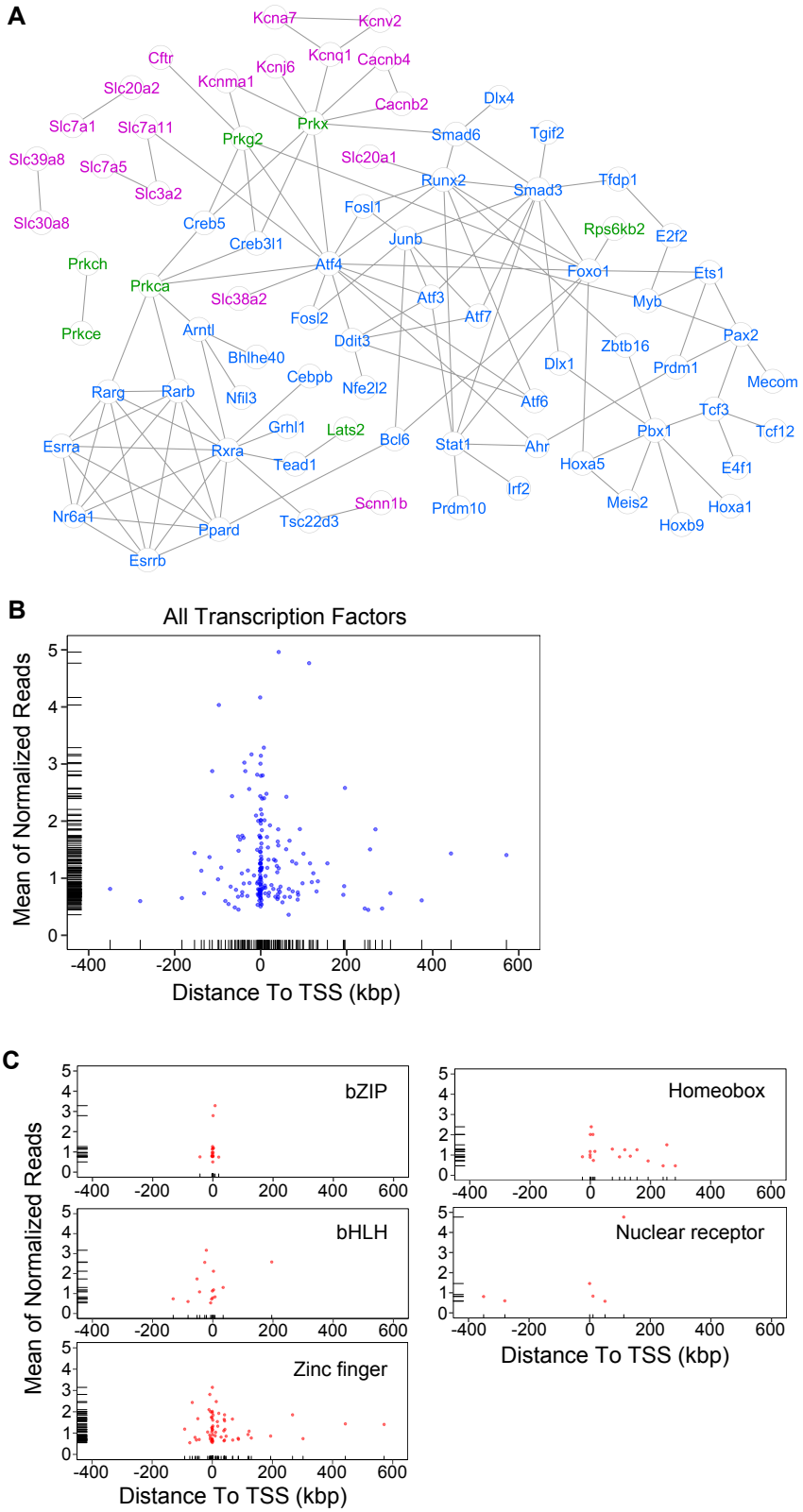
Supplemental Figure 4. *Expression of CREB and C/EBPβ in the nucleus of mpkCCD cells.* Two fractions, cytosolic extract (Cyt) and nuclear extract (NE), were obtained from the mpkCCD cells cultured on the permeable filters. (A) Protein expression of CREB and C/EBPβ in cytosolic and nuclear extracts isolated from mpkCCD cells incubated with 0.1 nM dDAVP or vehicle for 24 h. (B) Protein expression of CREB and C/EBPβ in cytosolic and nuclear extracts by short-term response to 0.1 nM dDAVP or vehicle (30 and 60 min). Molecular weight of CREB is 37 kDa; molecular weights of two isoforms of C/EBPβ are 38 kDa (liver activating protein, LAP) and 20 kDa (liver inhibitory protein, LIP).

Supplemental Figure 5



Supplemental Figure 5. *Complement of minimum Bayes' factor (MBF) from read distribution of ChIP-Seq for C/EBPβ within the Faim2-Aqp2-Aqp5 insulated loop.* Tracks for CTCF ChIP-Seq and C/EBPβ ChIP-Seq on the UCSC genome browser show read distribution from ChIP-Seq analysis in mpkCCD cells (30 min and 24 h treatment of dDAVP or vehicle). Minimum Bayes' factor (MBF) calculated from the signal-to-noise ratio were shown as the complement of the MBF in next four plots. Noise values for this calculation were estimated as 7 times the median read density value across the loop.

Supplemental Figure 6



Supplemental Figure 6. *Interactive network of genes (transcription factors, kinases and transporters) with C/EBPβ-binding sites on their promoter or gene body.* (A) Interactive network of genes (transcription factors, kinases and transporters). The network was based on String (10.0) database and generated using Cytoscape (3.4). Yellow nodes were genes that have over 3 connections. (B) Plots for C/EBPβ-binding location (distance to transcription start site) and ChIP-Seq signal (the normalized read count) in C/EBPβ-bound transcription factor genes in dDAVP-treated cells. (C) Plots for C/EBPβ-bound transcription factor genes of four transcription factor family among total C/EBPβ-bound transcription factor genes identified from ChIP-Seq of dDAVP-treated cells.

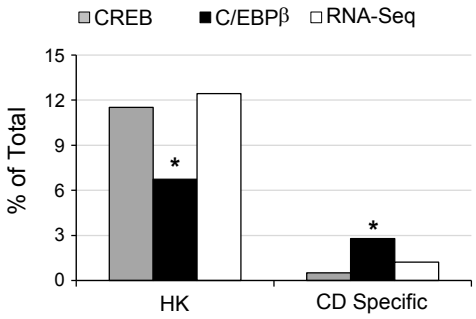
Supplemental Figure 7

A

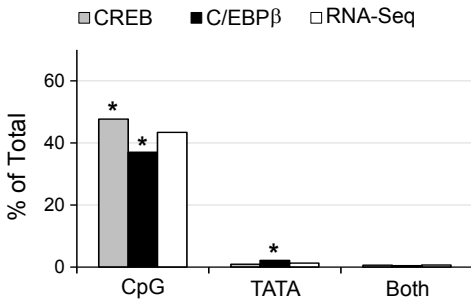
Chi-square statistic analysis

	CREB ChIP-Seq		C/EBPβ ChIP-Seq		RNA-Seq in mpkCCD
	Gene number (973 genes)	Chi-square	Gene number (1575 genes)	Chi-square	Whole transcriptome (8393 genes)
HK	112/973	0.68	106/1575	**42.20**	1043/8393
CD-specific	5/973	3.61	44/1575	**23.40**	101/8393
CpG	464/973	**6.49**	583/1575	**22.17**	3643/8393
TATA	9/973	0.93	34/1575	**7.18**	108/8393
Both	6/973	0.02	7/1575	0.95	55/8393

B



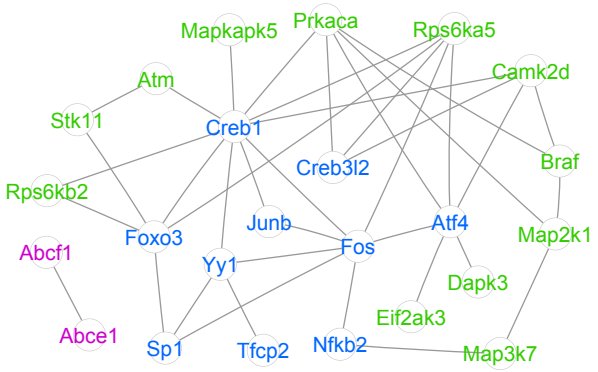
C



Supplemental Figure 7. *Classification of genes with CREB- and C/EBPβ-binding sites by expressional pattern and promoter types.* (A) Statistical analysis using *Chi-square*. (B) Genes with CREB- and C/EBPβ-binding sites that express ubiquitously ('housekeeping (HK) genes') or specifically ('Collecting duct (CD) specific genes') across the microdissected tubules of rat kidney from prior RNA-Seq dataset[1] were identified. Transcription factors may play roles in specifying cell-type-specific gene expression, e.g. the *Aqp2* gene in renal collecting duct principal cells. Alternatively, they may be general determinants of cell function by specifying expression of so-called "housekeeping" genes. Housekeeping genes were less frequent among genes with C/EBPβ-binding sites than for the mpkCCD transcriptome in general, while collecting duct-specific genes were more frequent among genes with C/EBPβ-binding sites. This suggests a possible role for C/EBPβ in collecting duct-specific gene expression beyond the *Aqp2* gene. Additional collecting duct-specific genes that have C/EBPβ-binding sites include an aldosterone-regulated membrane protein (*Fxyd4*), a membrane-spanning glycoprotein (*Muc20*), a small GTP-binding protein (*Rab15*), an AP2 transcription factor (*Tfap2a*), a TGF-β regulated transcription factor (*Tgif2*) and a sodium-bile acid cotransporter (*Slc10a7*). All of these sites are intronic and are increased by dDAVP treatment. In contrast, the frequency of housekeeping and collecting duct-specific genes among genes with CREB-binding sites was not different from that of the general transcriptome. (C) Genes with CREB- and C/EBPβ-binding sites with different core promoter types were identified. Core promoters were classified as promoters containing CpG, TATA-box, either and neither (others) of CpG and TATA-box. Another way to classify genes is based on whether they possess CpG islands or TATA boxes in their promoter proximal regions. Tissue-specific genes tend to possess TATA boxes, while housekeeping genes tend to have promoter-proximal CpG islands. Among genes with CREB-binding sites, a greater fraction have CpG islands than among the all expressed genes in mpkCCD cells. Conversely, among genes with C/EBPβ-binding sites, a smaller fraction have CpG islands than

among the expressed genes. In contrast, genes with TATA boxes are more frequent among genes with C/EBPβ-binding sites than among all expressed genes. These observations further support the potential role of C/EBPβ in cell-specific gene expression in collecting duct principal cells. Significance ($p < 0.05$) of distribution was tested by comparing distribution of total genes identified from prior RNA-Seq of mpkCCD cells using the Fisher exact test. *: $p < 0.05$.

Supplemental Figure 8



Supplemental Figure 8. *Interactive network of genes (transcription factors, kinases and transporters) with CREB-binding sites on their promoter or gene body.* The network was based on *String* (10.0) database and generated using *Cytoscape* (3.4).

Supplemental Table 1. Functional annotations of C/EBPβ-bound genes*

Location	Function	Family (no. of genes)	Genes
Promoter	Transcription Factor	zf-C2H2 (26)	*Bcl6, Zbtb16, Zbtb20, Zbtb38, AI987944, Bnc2, E4f1, Glis3, Hivep1, Hivep2, Klf11, Klf13, Klf3, Mecom, Plagl1, Prdm1, Prdm10, Rreb1, Zfp212, Zfp217, Zfp236, Zfp553, Zfp618, Zfp672, Zfp707, Zfpm2, L3mbtl1, Myt1l, Litaf, Zmiz1*
		Homeo-box (12)	*Cers2, Cphx2, Dlx1, Duxbl2, Hmbox1, Hoxa3, Hoxa5, Meis2, Pbx1, Tgif2, Zfhx3, Pou2f3*
		bZIP (10)	*Atf3, Atf4, Atf7, Cebpb, Creb3l1, Fosl2, Nfe2l1, Nfe2l2, Nfil3, Tsc22d3*
		bHLH (7)	*Ahr ,Arntl ,Bhlhe40 ,Figla ,Mnt ,Mxi1 ,Tcf12*
		ETS (3)	*Ehf, Elf1, Ets1*
		THR-like (3)	*Ppard, Rarb, Rarg*
		zf-C2HC (2), Ig-fold (2), MH1 (2), E2F (2), ARID (2), CSD (2)	*Arid1b, Jarid2, Csde1, Ybx3, E2f2, Tfdp1, Foxo1, Foxp1, Smad3, Smad6*
		HMG, IRF, AP-2, CP2, MBD, Tub, MYB, PAX, TEA, AF-4, ESR-like, CTF/NFI, CG-1, zf-MIZ, zf-LITAF-like, GCNF-like, RXR-like (17)	*Aff1, Tfap2a, Camta1, Grhl1, Nfix, Esrrb, Nr6a1, Bbx, Irf2, Baz2b, Myb, Trp63, Pax2, Runx2, Rxra, Tead1, Tulp4, Litaf, Zmiz1*
	Kinase	AGC (3)	*Prkx, Rps6kb2*
	Transporter	SLC (8)	*Slc13a2, Slc20a1, Slc25a1, Slc25a27, Slc25a39, Slc33a1, Slc35e3, Slc7a11*
		ABC (3)	*Abcb1b, Abcc3, Abcd3*
		CLC (2)	*Clcn3, Clcn6*
		CLAUDIN, KCN, MPC, SFXN, TPC, V-ATPase (6)	*Cldn8, Kcnk13, Mpc2, Sfxn3, Tpcn1, Tcirg1*
Gene Body	Transcription Factor	zf-C2H2 (7)	*Mynn, Zbtb44, Zbtb48, Zfp1, Zfp266, Zfp809, 2610008E11Rik*
		bZIP (6)	*Atf6, Atf7, Creb5, Ddit3, Fosl1, Junb*
		Homeobox (4)	*Dlx4, Hlx, Hoxa1, Hoxb9*
		bHLH (2)	*Mnt, Tcf3*
		HMG, CP2, ARID, ETS, IRF, Ig-fold, ESR-like, zf-C2HC, zf-BED (9)	*Hmgxb3, Arid4a, Ehf, Kat7, Grhl2, Esrra, Stat1, Irf2,2700081O15Rik*
	Kinase	AGC (7)	*Cdc42bpb, Lats2, Mast4, Prkca, Prkce, Prkch, Prkg2*
	Transporter	SLC (23)	*Slc10a7, Slc12a3, Slc12a8, Slc15a3, Slc16a12, Slc17a5, Slc1a4, Slc20a2, Slc22a23, Slc25a25, Slc25a27, Slc2a1, Slc30a8, Slc38a2, Slc38a7, Slc39a8, Slc3a2, Slc43a2, Slc44a3, Slc7a1, Slc7a15, Slc7a15, Slc7a5*
		KCN (6)	*Kcna7, Kcnj6, Kcnk1, Kcnma1, Kcnq1, Kcnv2*
		ABC (5)	*Abca4, Abcc4, Abcc5, Abcf2, Cftr*

		CACN (2)	*Cacnb2, Cacnb4*
		CLC, CLIC, CONNEXIN, ENAC, RH, SCN, SLCO, TRP (8)	*Clcn3, Clic6, Gjb3, Scnn1b, Rhbg, Scn9a, Slco6b1, Trpv3*

* C/EBPβ-enriched peaks obtained from C/EBPβ ChIP-Seq were mapped to genes using an R package *ChIPpeakAnno* (version 3.2.2). Function of genes was identified by mapping gene symbols to annotated lists of transcription factors (https://hpcwebapps.cit.nih.gov/ESBL/Database/TranscriptionFactors/), protein kinases (https://hpcwebapps.cit.nih.gov/ESBL/Database/Kinases/) and transporters (https://hpcwebapps.cit.nih.gov/ESBL/Database/NephronRNAseq/Transporters_and_Channels.html).

Supplemental Table 2. Vasopressin-mediated regulation of genes with C/EBPβ-binding sites

Gene Symbol	Response to vasopressin			References
	Expression	Phosphorylation	Half-life	(): PMID
Atf3	Increased			Cai et al. 2007 (17913837)
Atf4	Increased			Cai et al. 2010 (20668095)
Ddit3	Increased			Cai et al. 2010 (20668095)
Junb	Increased			Sandoval et al. 2013 (24029424)
Scnn1b	Increased			Ecelbarger et al. 2000 (10894786) Brooks et al. 2003 (12388413) Djelidi et al. 1997 (9407070)
Fosl1			Decreased	Sandoval et al. 2013 (24029424)
Cebpb			Increased	Sandoval et al. 2013 (24029424)
Prkca			Increased	Sandoval et al. 2013 (24029424)
Rps6kb2			Increased	Sandoval et al. 2013 (24029424)

Supplemental Table 3. Functional annotations of CREB-bound genes*

Location	Function	Family (no. of genes)	Genes
Promoter	Transcription Factor	zf-C2H2 (13)	*Hinfp, Rlf, Sp1, Yy1, Zbtb11, Zfp142, Zfp143, Zfp410, Zfp523, Zfp661, Zfp672, Zfp738, Zfp869*
		bZIP (6)	*Atf4, Creb1, Creb3l2, Fos, Junb, Mafk*
		RFX (3)	*Rfx1, Rfx3, Rfx5*
		HMG (2)	*Hmg20b, Wdhd1*
		Forkhead, bHLH, CP2, MYB, zf-NF-X1, RHD (6)	*Tcf3, Tfcp2, Foxo3, Nfkb2, Nfx1, Cdc5l*
	Protein Kinase	CAMK (6)	*Camk2d, Dapk3, Mapkapk5, Mark3, Pskh1, Stk11*
		STE (4)	*Map2k1, Map3k7, Map3k12, Oxsr1*
		Atypical (3)	*Adck5, Atm, Riok2*
		CMGC (2)	*Cdk11b, Clk4*
		AGC (2)	*Prkaca, Rps6kb2*
		CK1,TKL,NEK (3)	*Csnk1g2, Braf, Nek1*
		Not classified (5)	*Eif2ak3, Plk2, Stk16, Tbck, Tex14*
	Transporter	SLC (7)	*Slc25a3, Slc25a16, Slc25a28, Slc35b1, Slc35e1, Slc35e1, Slc35f5, Slc38a6*
		ABC (4)	*Abce1, Abcf1, Abcf2, Tap1*
		CLC (1)	*Clcn3*
Gene Body	Transcription Factor	zf-C2H2 (9)	*Mynn, Rlf, Zbtb21, Zfp335, Zfp65, Zfp868, Zfp869, Zfp874b, Zfp963*
		HMG (2)	*Hbp1, Tox4*
		bHLH, GCNF-like (2)	*Mxi1, Nr6a1*
	Protein Kinase	AGC (3)	*Mastl, Rps6ka5, Rps6kb2*
		STE (1)	*Map3k11*
		Not classified (1)	*Gak*

*CREB-enriched peaks obtained from CREB ChIP-Seq were mapped to genes using an R package *ChIPpeakAnno* (version 3.2.2). Function of genes was identified by mapping gene symbols to annotated lists of TFs (https://hpcwebapps.cit.nih.gov/ESBL/Database/TranscriptionFactors/), protein kinases (https://hpcwebapps.cit.nih.gov/ESBL/Database/Kinases/) and transporters (https://hpcwebapps.cit.nih.gov/ESBL/Database/NephronRNAseq/Transporters_and_Channels.html).

Supplemental Table 4. Vasopressin-mediated regulation of genes with CREB-binding sites

Gene Symbol	Response to vasopressin			Reference ((): PMID
	Expression	Phosphorylation	Half-life	
Abce1	Increased		Not changed	Cai et al. 2007 (17913837) Sandoval et al. 2013 (24029424)
Atf4	Increased			Cai et al. 2010 (20668095)
Fos	Increased			Brooks et al. 2003 (12388413)
Junb	Increased			Schenk et al. 2012 (22440904)
Camk2d		Increased		Rinschen et al. 2010 (20139300)
Creb1		Increased		Rinschen et al. 2010 (20139300)
Map3k7		Increased		Hoffert et al. 2012 (22108457)
Abcf1		Decreased	Not changed	Hoffert et al. 2012 (22108457) Sandoval et al. 2013 (24029424)
Map2k1		Decreased	Increased	Pisitkun et al. 2008 (18667481) Sandoval et al. 2013 (24029424)
Atm			Increased	Sandoval et al. 2013 (24029424)
Rps6kb2			Increased	Sandoval et al. 2013 (24029424)
Sp1			Decreased	Sandoval et al. 2013 (24029424)

Full Methods

Cell culture. AQP2-expressing mpkCCD clone 11 (mpkCCD) cells (passage number: 7-12) were grown in complete medium, DMEM/F-12 containing 2% fetal bovine serum and other supplements (5 μg/mL insulin, 50 nM dexamethasone, 1 nM triiodothyronine, 10 ng/mL epidermal growth factor, 60 nM sodium selenite, 5 μg/mL transferrin, all from Sigma) on permeable membrane supports (0.4 μm pore size, Transwell, 3419 or 3450, Corning) as described.[1] The polarization of cells was determined by transepithelial resistance meaurements using the Epithelial Volt ohmmeter (WPI). The polarized cells were incubated for 24h in the serum- and hormone-free medium, DMEM/F12 containing 60 nM sodium selenite, and 5μg/mL transferrin, and then were exposed to [deamino-Cys1, D-Arg8]-Vasopressin (dDAVP, 0.1 nM times indicated in text) or vehicle at the basolateral side.

Preparation of nuclear and cytoplasmic fractions. Nuclear and cytosolic fractions were isolated from mpkCCD cells using NE-PER Nuclear and Cytoplasmic Extraction Reagent Kit (Pierce, Rockfort, IL).[2] Briefly, the cells were washed with cold PBS and collected in cold PBS using a cell scrapper. The cell pellet was obtained by centrifugation (500×g for 5 min at 4°C) and resuspended in 200 μL of buffer 1 containing a protease and phosphatase inhibitor cocktail (HaltTM Protease and Phosphatase Inhibitor Cocktail, Pierce) followed by addition of buffer 2. After incubation on ice, the nuclear fraction was isolated by centrifugation (17,000×g for 5 min at 4°C), and the supernatant (cytoplasmic extract) was stored at -80°C. The pellets were resuspended in 100 μL of buffer 3 containing protease and phosphatase inhibitor cocktail and incubated for 40 min on ice. The nuclear extract was obtained by centrifugation at 17,000×g for 5 min at 4°C. BCA assay (BCA Protein Assay Kit, Pierce) was performed to measure the protein mass in each fraction.

Immunoblotting. Immunoblotting was performed as described.[3] The protein samples were separated on 12% polyacrylamide gels (Criterion TGX precast gels, Bio-Rad) and transferred onto nitrocellulose membranes (0.2 µm, Bio-Rad). The membranes were incubated with Odyssey blocking buffer (Li-Cor, Lincoln, NE) for 1 h and probed with primary antibody in Odyssey blocking buffer containing 0.5% Tween-20 overnight at 4°C. Primary antibodies were obtained commercially and used as followed: CREB antibody (2 µg, 17-600, Millipore), C/EBPβ (2 µg, sc-150, Santa Cruz), p-CREB antibody (S133, 17-10131, Millipore), ATF1 antibody (sc-243, Santa Cruz), β-catenin antibody (9562, Cell Signaling) and p-β-catenin antibody (S552, 9566, Cell Signaling). After removal of the primary antibody solution, the membranes were washed and incubated for 1 h with anti-rabbit IgG antibody conjugated with appropriate fluorescent dyes (Lincoln, NE, 1:5,000). The fluorescent signal was detected using a Li-Cor Odyssey Imaging System (ODY-0428, Li-COR).

Assay for Transposase-Accessible Chromatin using Sequencing (ATAC-Seq). ATAC-Seq was performed following a method published by Buenrostro et al..[4] Briefly, a homogenous single cell suspension was prepared by harvesting cells using a cell scraper and a cell strainer in cold PBS buffer. 50,000 cells were centrifuged at 500×g for 5 min, 4°C and washed with 50 µl of cold PBS buffer. The plasma membrane was lysed in 50 µl of cold lysis buffer (10 mM Tris-HCl, pH 7.4, 10 mM NaCl, 3 mM $MgCl_2$, 0.1% NP-40) and centrifuged immediately at 500×g for 10 min, 4°C to obtain nuclei. The nuclear pellets were reacted in the transposition reaction mixture of 1X Tagment DNA Buffer (FC-121-1030, Illumina) and Tn5 transposase (FC-121-1030, Illumina) for 30 min at 37°C. DNA was purified using a Qiagen MinElute PCR Purification Kit (QIAGEN). The transposed DNA fragments were amplified in the PCR mixture containing a specific index adapter (Illumina standard index adapter) for each sample by PCR (5 cycles as initial PCR and 9-11 cycles as final PCR). Amplified libraries were purified using a AMPure beads (1:1.8 ratio, BECKMAN COULTER). Libraries were quantified using a Qubit® dsDNA

High-Sensitivity Assay Kit (Q32854, Life Technologies). Fragment size distribution was tested on E-Gel (2%, Invtrogen). DNA libraries were sequenced on an Illumina HiSeq 3000 platform by the NHLBI DNA Sequencing and Genomics Core, NHLBI.

Chromatin immunoprecipitation (ChIP) followed by DNA sequencing (ChIP-Seq). Chromatin immunoprecipitation (ChIP) of CREB and C/EBPβ was performed using truChIP™ Chromatin Shearing Reagent Kit (Covaris) and SimepleChIP® Enzymatic Chromatin IP Kit (Cell Signaling) as manufacturer's protocol. Buffers used in the ChIP procedure were provided in the kits. Cells were grown on permeable membrane supports (Transwell permeable support 100 mm dish, 3419, Costar) until fully polarized (7 days). The cells were incubated in serum- and hormone-free medium for 24 h before dDAVP treatment and exposed to 0.1 nM dDAVP or vehicle at basolateral side for 30 min or 24 hours. The cells on membrane supports were washed with PBS and exposed to "fixation buffer" (included in kit) for 5 min. A solution containing formaldehyde (final 1.1%) was added to the cells to crosslink DNA with DNA-bound proteins. The crosslink reaction was quenched by adding the "quenching buffer" for 5 min. The cells were collected in 5 mL PBS using a cell scraper and centrifuged at 200×g for 5 min at 4°C. Cells were washed with PBS and lysed in lysis buffer containing the protease inhibitor cocktail described above. To increase the efficiency of lysis, the solution was resuspended gently using a pipette and the tubes were rotated gently for 10 min at 4°C. The pellets were collected by centrifugation at 1,700×g for 5 min at 4°C, washed with wash buffer containing protease inhibitor cocktail, and washed two times with 1 mL of shearing buffer containing the protease inhibitor cocktail. The nuclear pellets were resuspended in shearing buffer. The samples were transferred to new glass tubes with AFA Fiber (TC 12×12 mm, Covaris) and sheared using a Covaris S2 system (Duty cycle: 5%, Intensity: 4, Cycles per Burst: 200, Temperature: 4°C). Protein mass in the sheared chromatin samples was determined by BCA assay. For DNA purification, the sheared chromatin sample (20 µL) was treated with RNase (30 min, 37°C) and

proteinase K (16 h, 65°C) serially. The sheared DNAs were purified using a DNA Clean & ConcentratorTM-5 (D4014, Zymo Research) and DNA amounts were measured using a Qubit® dsDNA High-Sensitivity Assay Kit (Q32854, Life technologies).

For immunoprecipitation (IP) of CREB and C/EBPβ in the sheared chromatin samples, 800-900 μg of total sheared chromatin was used for each IP set. The sheared chromatin samples were incubated with 4 μg of CREB antibody (17-600, Millipore), C/EBPβ (sc-150, Santa Cruz) or normal IgG rabbit antibody (2729P, Cell Signaling, Inc.) at 4°C overnight with gentle rotation. Magnetic beads conjugated with Protein G (ChIP-Grade Protein G Magnetic Beads, Cell Signaling, Inc.) were added to the samples. After incubation for 2 h, the beads were collected using a magnetic rack and washed following the manufacturer's protocol (Cell Signaling, Inc.). The beads were incubated in ChIP elution buffer for 30 min at 65°C with vortexing (1,200 rpm). After ChIP, DNA was purified for deep sequencing. Briefly, proteins in ChIP samples were degraded by treatment with Proteinase K/5 M NaCl solution overnight at 56°C. DNA was purified and concentrated using a DNA Clean & ConcentratorTM-5 (D4014, Zymo Research) and DNA amounts were measured using a Qubit® dsDNA High-Sensitivity Assay Kit (Q32854, Life technologies).

For deep sequencing of transcription factor ChIP products, a library was prepared using Ovation® SP Ultralow Library System (NuGEN) as described in the manufacturer's protocol. The purified DNA from ChIP products were mixed with RNAclean XP beads (BECKMAN COULTER) to enrich DNA and incubated for 10 min at room temperature. The DNA-bead mixture was used to prepare libraries: 10 μL from each ChIP sample and 7 μL from each 2% input sample. The mixture of beads and DNA were loaded on a Mondrian SP Cartridge. The DNAs were repaired and ligased with specific adaptors (L2V9DR-1 to -8) in each sample automatically. The eluted DNA was collected from the cartridge and mixed with Library Enrichment Master Mix. The enrichment was carried out through PCR (DNAs were denatured at

94°C for 30 sec. Annealing of primers to the templates and extension were allowed at 60°C for 30 sec and 72°C for 1 min sequentially. DNA libraries were enriched by repeating PCR with 10-16 cycles. The enriched DNA libraries were purified and separated on E-Gel® EX 2% agarose gel (G402002, Invitrogen). The DNA libraries were purified from the gel piece between 250 bp and 500 bp using a Gel DNA Recovery kit (D4008, Zymo Research). Ten nanograms of DNA library from each sample were used for deep sequencing on an Illumina HiSeq 2000 platform by the NHLBI DNA Sequencing and Genomics Core, NHLBI.

Data processing. Sequencing data was qualified by FastQC (http://www.bioinformatics.babraham.ac.uk/projects/fastqc). The sequence reads were mapped on the mouse reference genome (mm10) using *Burrows-Wheeler Aligner* (*BWA*)[5] and *Samtools*.[6] All reads mapped to the reference genome (95~98% of mapping rate) were used for downstream peak calling, motif analysis, and bioinformatic analysis. Peaks were called from total mapped reads by *MACS2* (version 2.1, default with q<0.01). Reproducible peaks were identified by intersection between multiple replicates for quantification of read counts from each replicate using *Bedtools*.[7] Motif analysis of CREB and C/EBPβ binding sites identified by *MACS2* and *Bedtools* was carried out using *MEME-ChIP* (version 4.11).[8] R package *ChIPpeakAnno* (version 3.2.2)[9] was used in the analysis for genomic distribution of transcription factor binding sites and gene annotation near transcription factor binding sites. Plots were generated using R package *ggplot2*.[10]

For ATAC-Seq data processing, adapter sequences were trimmed for both forward and reverse reads using *cutadapt* (-q 30 --minimum-length 36 --paired-output) and aligned on mouse reference genome mm10 using *bowtie2* (-q -X 2000 --no-mixed --no-discordant). Duplicates were removed from mapped reads using *Picard*. Bam files were converted to Bed files using *Bedtools*. Reads were shifted 4 bp for the forward reads and 5 bp for the reverse reads. Peaks were identified using *MACS2* (-q 0.01 --nomodel --shift -37 --extsize 73 --keep-dup -SPMR).

BigWig files for UCSC browser tracks were generated using *UCSC bedClip* and *bedGraphToBigWig*.

Data mining and bioinformatic analysis. A dataset of CTCF ChIP-Seq was downloaded from mouse ENCODE database published by Yue et al. (GEO, GSE 36027).[11] Two ChIP-Seq datasets obtained in mpkCCD clone 11 cells were downloaded from GSE95009 for histone H3K27 acetylation ChIP-Seq[12] and GSE79584 for RNA polymerase II ChIP-Seq.[13] Data from ATAC-Seq, H3K27Ac ChIP-Seq, and RNA polymerase II ChIP-Seq were transformed to obtain minimum Bayes' factors (range 0-1) as described[14] based on signal-to-noise ratios as a function of genomic position. The noise level for a given insulated region was estimated as twice the median signal across the region. The data from ATAC-Seq, H3K27Ac ChIP-Seq, and RNA polymerase II ChIP-Seq were integrated by multiplying the complements of their minimum Bayes' factors.

ATAC-Seq and ChIP-Seq data have been deposited at Gene Expression Omnibus (GEO, GSE98076 and GSE108786).

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Suuplemental Dataset 1. Transcription factors expressed in mpkCCD

Isobe K, Jung HJ, Yang CR, Claxton J, Sandoval P, Burg MB, Raghuram V, Knepper MA. Systems-level identification of PKA-dependent signaling in epithelial cells. Proc Natl Acad Sci U S A. 2017 Oct 17;114(42):E8875-E8884. doi: 10.1073/pnas.1709123114. Epub 2017 Oct 2. PubMed PMID: 28973931

Gene Symbol	Description	TPM mean	TPM SD	TF Family
Atf4	cyclic AMP-dependent transcription factor ATF-4	578.8	63.7	TF_bZIP
Tsc22d1	TSC22 domain family protein 1 isoform X5	410.9	55.2	TSC22
Ybx1	nuclease-sensitive element-binding protein 1	321.4	9.8	CSD
Tsc22d3	TSC22 domain family protein 3 isoform X1	284.8	18.2	TSC22
Csde1	cold shock domain-containing protein E1 isoform X3	283.3	20.3	CSD
Jund	transcription factor jun-D isoform deltaJunD	269.1	61.7	TF_bZIP
Ssrp1	FACT complex subunit SSRP1	248.2	26.2	HMG
Junb	transcription factor jun-B	245.0	29.1	TF_bZIP
Ybx3	Y-box-binding protein 3 long isoform	223.5	10.8	CSD
Cers2	ceramide synthase 2 isoform X1	192.4	8.2	Homeobox
Zfp91	E3 ubiquitin-protein ligase ZFP91	185.8	12.6	zf-C2H2
Esrrb	steroid hormone receptor ERR2 isoform 2	179.4	7.3	ESR-like
Litaf	lipopolysaccharide-induced tumor necrosis factor-alpha factor homolog	175.1	12.9	zf-LITAF-like
Ehf	ETS homologous factor isoform X3	168.8	19.7	ETS
Carhsp1	calcium-regulated heat stable protein 1	153.7	24.1	CSD
Trp53	cellular tumor antigen p53 isoform X1	148.2	8.5	P53
Nfe2l2	nuclear factor erythroid 2-related factor 2	147.0	11	TF_bZIP
Pax8	paired box protein Pax-8	141.5	9.6	PAX
Tfdp1	transcription factor Dp-1 isoform a	137.0	41.6	E2F

Elf3	ETS-related transcription factor Elf-3	136.7	7.6	ETS
Nr2f6	nuclear receptor subfamily 2 group F member 6	130.5	28.6	RXR-like
Klf6	Krueppel-like factor 6	129.8	8.9	zf-C2H2
Mta2	metastasis-associated protein MTA2	127.9	10.3	zf-GATA
Tcf3	transcription factor E2-alpha isoform 8	111.4	7.9	bHLH
Jdp2	jun dimerization protein 2 isoform X2	107.0	18.5	TF_bZIP
Hmg20b	SWI/SNF-related matrix-associated actin-dependent regulator of	106.3	7	HMG
Zfp7	zinc finger protein 7	105.7	10.8	zf-C2H2
Ubtf	nucleolar transcription factor 1 isoform X4	104.1	4.2	HMG
Hbp1	HMG box-containing protein 1 isoform X3	102.8	12.2	HMG
Glis2	zinc finger protein GLIS2 isoform X4	100.3	15.8	zf-C2H2
Hmgb1	high mobility group protein B1	99.1	2.7	HMG
Zzz3	ZZ-type zinc finger-containing protein 3 isoform X1	98.6	6.4	MYB
Cbfb	core-binding factor subunit beta isoform 4	98.2	24.3	CBF
Hoxd8	homeobox protein Hox-D8 isoform c	98.0	11	Homeobox
Mecom	MDS1 and EVI1 complex locus protein EVI1 isoform X11	97.8	21.3	zf-C2H2
Sp3	transcription factor Sp3 isoform 1	97.8	7.3	zf-C2H2
Gtf2i	general transcription factor II-I isoform 5	97.1	30.4	GTF2I
Srebf1	sterol regulatory element-binding protein 1 isoform 2	97.1	11.5	bHLH
Hmgb2	high mobility group protein B2 isoform X1	96.7	13.9	HMG
Scx	basic helix-loop-helix transcription factor scleraxis	96.6	30.3	bHLH
Zhx3	zinc fingers and homeoboxes protein 3	93.2	11	Homeobox
Hoxb9	homeobox protein Hox-B9	93.1	13.2	Homeobox
Irf6	interferon regulatory factor 6 isoform X1	92.7	12.7	IRF

Cux1	protein CASP isoform X1	91.1	23.7	CUT
Tfcp2l1	transcription factor CP2-like protein 1 isoform X1	90.8	17.1	CP2
Gtf3a	transcription factor IIIA	90.2	15.4	zf-C2H2
Nfe2l1	nuclear factor erythroid 2-related factor 1 isoform 4	88.6	20.4	TF_bZIP
Rarg	retinoic acid receptor gamma isoform X1	88.2	7.6	THR-like
Elf2	ETS-related transcription factor Elf-2	87.5	3.1	ETS
Zfp740	zinc finger protein 740 isoform X5	85.6	3.1	zf-C2H2
Maz	myc-associated zinc finger protein	84.9	11.1	zf-C2H2
Id2	DNA-binding protein inhibitor ID-2	84.4	2.3	bHLH
Xbp1	X-box-binding protein 1 isoform XBP1(S)	83.4	3.8	TF_bZIP
Ets2	protein C-ets-2	82.2	15.4	ETS
Rela	transcription factor p65 isoform X2	81.3	13.4	RHD
Foxq1	forkhead box protein Q1	80.4	8.1	Fork head
Elf1	ETS-related transcription factor Elf-1	80.1	17.1	ETS
Yy1	transcriptional repressor protein YY1 isoform X1	78.6	0.1	zf-C2H2
Hoxb7	homeobox protein Hox-B7	78.4	11	Homeobox
Gatad1	GATA zinc finger domain-containing protein 1	77.5	14.5	zf-GATA
Hes1	transcription factor HES-1 isoform X1	77.3	5.3	bHLH
Tead2	transcriptional enhancer factor TEF-4 isoform a	76.3	15.9	TEA
Tgif1	homeobox protein TGIF1 isoform X1	75.9	8.1	Homeobox
Ddit3	DNA damage-inducible transcript 3 protein	71.3	18.5	TF_bZIP
Sub1	activated RNA polymerase II transcriptional coactivator p15	69.2	6.2	PC4
E2f4	transcription factor E2F4	68.3	11.8	E2F
Nfat5	nuclear factor of activated T-cells 5 isoform c	65.3	28.4	RHD

Ctcf	transcriptional repressor CTCF isoform X6	65.2	12	zf-C2H2
Aff4	AF4/FMR2 family member 4	65.1	10.3	AF-4
Stat6	signal transducer and transcription activator 6	64.3	9.5	STAT
Klf5	Krueppel-like factor 5	64.2	8.4	zf-C2H2
Nr1h2	oxysterols receptor LXR-beta isoform a	63.9	2.5	THR-like
Hoxd4	homeobox protein Hox-D4	63.8	4.2	Homeobox
Gata3	trans-acting T-cell-specific transcription factor GATA-3	63.2	14.8	zf-GATA
Myc	myc proto-oncogene protein isoform b	61.7	8.7	bHLH
Zfp410	zinc finger protein 410 isoform 1	61.7	5.5	zf-C2H2
Mxd3	max dimerization protein 3	60.8	10.5	bHLH
Cdc5l	cell division cycle 5-like protein isoform X1	60.5	3.3	MYB
Grhl2	grainyhead-like protein 2 homolog isoform X4	60.5	3.8	CP2
Mxd4	max dimerization protein 4	60.4	12.9	bHLH
Nfkb2	nuclear factor NF-kappa-B p100 subunit isoform b	59.8	7.1	RHD
Whsc1	histone-lysine N-methyltransferase NSD2 isoform X1	58.4	11.6	HMG
Sp1	transcription factor Sp1 isoform X1	57.7	6.8	zf-C2H2
Zkscan1	zinc finger protein with KRAB and SCAN domains 1 isoform X2	57.3	8.8	zf-C2H2
Nfkb1	nuclear factor NF-kappa-B p105 subunit	56.4	10.8	RHD
Irf3	interferon regulatory factor 3 isoform X1	56.3	1.6	IRF
Mta3	metastasis-associated protein MTA3 isoform X5	55.9	6.4	zf-GATA
Zfp664	zinc finger protein 664	55.9	13.9	zf-C2H2
Patz1	POZ-, AT hook-, and zinc finger-containing protein 1 isoform 2	55.7	5.9	ZBTB
Zfp219	zinc finger protein 219 isoform X1	55.4	16.8	zf-C2H2
Cdip1	cell death-inducing p53-target protein 1 isoform X1	55.0	2.9	zf-LITAF-like

Hsf1	heat shock factor protein 1 isoform 5	54.7	2.8	HSF
Kat7	histone acetyltransferase KAT7 isoform X4	54.3	6.3	zf-C2HC
Max	protein max isoform X3	54.1	7	bHLH
Zfp266	zinc finger protein 426-like isoform X1	54.0	8.8	zf-C2H2
Ncor1	nuclear receptor corepressor 1 isoform 2	53.8	4.9	MYB
Thap7	THAP domain-containing protein 7 isoform X4	53.8	0.6	THAP
Rxrb	retinoic acid receptor RXR-beta isoform 4	53.7	3.9	RXR-like
Mta1	metastasis-associated protein MTA1 isoform X2	53.6	4.7	zf-GATA
Setdb1	histone-lysine N-methyltransferase SETDB1 isoform b	53.3	3.1	MBD
Aebp2	zinc finger protein AEBP2 isoform 3	52.8	7.4	zf-C2H2
Mbd3	methyl-CpG-binding domain protein 3 isoform 2	52.8	3	MBD
Rxra	retinoic acid receptor RXR-alpha isoform X1	52.2	8	RXR-like
Smad4	mothers against decapentaplegic homolog 4 isoform X1	52.0	2.1	MH1
Zbtb7b	zinc finger and BTB domain-containing protein 7B isoform X1	51.2	3.3	ZBTB
Hoxd9	homeobox protein Hox-D9	50.3	9.8	Homeobox
Ets1	protein C-ets-1 isoform X1	50.1	6.2	ETS
Foxo3	forkhead box protein O3 isoform X1	49.6	3.9	Fork head
Mbd2	methyl-CpG-binding domain protein 2 isoform 2	49.2	1.5	MBD
Rcor1	REST corepressor 1 isoform X1	48.5	4.5	MYB
Hes6	transcription cofactor HES-6 isoform X1	48.4	8.3	bHLH
Thap11	THAP domain-containing protein 11	48.4	5.1	THAP
Dnajc2	dnaJ homolog subfamily C member 2	48.3	2.6	MYB
Gabpa	GA-binding protein alpha chain	47.1	0.4	ETS
Vezf1	vascular endothelial zinc finger 1 isoform X2	46.8	2.5	zf-C2H2

Srebf2	sterol regulatory element-binding protein 2 isoform X1	46.7	8.3	bHLH
Jun	transcription factor AP-1	46.3	6	TF_bZIP
Nrf1	nuclear respiratory factor 1 isoform b	45.7	2.1	Nrf1
Wdhd1	WD repeat and HMG-box DNA-binding protein 1	45.6	9.4	HMG
Zfp386	zinc finger protein 386 (Kruppel-like) isoform X2	45.4	1.8	zf-C2H2
Zscan21	zinc finger and SCAN domain-containing protein 21 isoform X1	45.4	9.1	zf-C2H2
Zfp62	zinc finger protein 62 isoform X3	45.0	0.8	zf-C2H2
Tox4	TOX high mobility group box family member 4	44.6	4.9	HMG
Atf5	cyclic AMP-dependent transcription factor ATF-5	44.3	6.2	TF_bZIP
Usf1	upstream stimulatory factor 1 isoform 2	43.4	1.9	bHLH
Esrra	steroid hormone receptor ERR1	43.2	2.7	ESR-like
Zfp687	zinc finger protein 687 isoform X1	43.0	4.2	zf-C2H2
Zbtb18	zinc finger and BTB domain-containing protein 18 isoform 1	42.9	1.4	ZBTB
Pbrm1	protein polybromo-1 isoform X32	42.7	15.2	HMG
Smad5	mothers against decapentaplegic homolog 5 isoform X2	42.3	4.3	MH1
Zscan26	zinc finger and SCAN domain-containing protein 26 isoform X1	42.0	3	zf-C2H2
Klf10	Krueppel-like factor 10 isoform X1	41.4	2.2	zf-C2H2
Nfatc3	nuclear factor of activated T-cells, cytoplasmic 3	41.4	11.2	RHD
Zfp948	zinc finger protein 948 isoform X1	41.4	4.3	zf-C2H2
Cebpb	CCAAT/enhancer-binding protein beta isoform c	41.2	2	C/EBP
Crebzf	CREB/ATF bZIP transcription factor isoform X1	41.0	3.5	TF_bZIP
700081O15Ri	uncharacterized protein C11orf95 homolog isoform X2	40.9	6.4	zf-BED
Hmga1	high mobility group protein HMG-I/HMG-Y isoform e	40.8	3.2	HMGI/HMGY
Nfx1	transcriptional repressor NF-X1 isoform X2	40.8	2.2	zf-NF-X1

Thap4	THAP domain-containing protein 4 isoform 2	40.8	3.6	THAP
Hoxb6	homeobox protein Hox-B6 isoform X1	40.7	3.7	Homeobox
Tead3	transcriptional enhancer factor TEF-5 isoform 2	40.4	5.5	TEA
Irf1	interferon regulatory factor 1 isoform a	40.2	6.8	IRF
Zfp146	zinc finger protein OZF isoform X1	40.1	4	zf-C2H2
Aff1	AF4/FMR2 family member 1 isoform 1	39.9	10.4	AF-4
Smarcc2	SWI/SNF complex subunit SMARCC2 isoform X5	39.2	5.7	MYB
Smarce1	SWI/SNF-related matrix-associated actin-dependent regulator of	38.9	8.2	HMG
Prdm4	PR domain zinc finger protein 4 isoform X3	38.7	0.8	zf-C2H2
Mynn	myoneurin isoform 2	38.6	3	ZBTB
Zfp652	zinc finger protein 652	38.5	7.3	zf-C2H2
Atf2	cyclic AMP-dependent transcription factor ATF-2 isoform 3	38.3	4.9	TF_bZIP
Arid2	AT-rich interactive domain-containing protein 2	38.2	3.8	ARID
Mbd1	methyl-CpG-binding domain protein 1	38.2	3.6	MBD
Tfam	transcription factor A, mitochondrial isoform X1	38.2	5.9	HMG
Zkscan3	zinc finger protein with KRAB and SCAN domains 3 isoform X3	38.0	2	zf-C2H2
Foxj1	forkhead box protein J1 isoform X1	37.7	13.9	Fork head
Bbx	HMG box transcription factor BBX isoform X3	37.6	1.3	HMG
Foxk2	forkhead box protein K2	37.6	3.9	Fork head
Elk3	ETS domain-containing protein Elk-3 isoform Elk3c	37.2	5.6	ETS
Rest	RE1-silencing transcription factor isoform X1	37.1	5.2	zf-C2H2
Zfp335	zinc finger protein 335 isoform X2	37.1	3.8	zf-C2H2
Tcf12	transcription factor 12 isoform X8	36.9	4.3	bHLH
Dmtf1	cyclin-D-binding Myb-like transcription factor 1 isoform X2	36.8	4.9	MYB

Mlx	max-like protein X isoform beta	36.7	8.1	bHLH
Nfib	nuclear factor 1 B-type isoform X3	36.4	13.4	CTF/NFI
Adnp	activity-dependent neuroprotector homeobox protein isoform 1	36.1	13.5	Homeobox
Creb1	cyclic AMP-responsive element-binding protein 1 isoform C	35.8	1.9	TF_bZIP
Zfp263	zinc finger protein 263 isoform X1	35.7	1.3	zf-C2H2
Rorc	nuclear receptor ROR-gamma isoform X1	35.6	7.1	THR-like
Creb3	cyclic AMP-responsive element-binding protein 3	35.3	1.3	TF_bZIP
Zfp64	zinc finger protein 64	35.3	1.9	zf-C2H2
Zfp367	zinc finger protein 367 isoform X1	35.2	1.4	zf-C2H2
Kdm5c	lysine-specific demethylase 5C isoform X7	35.1	2.9	ARID
Foxn3	forkhead box protein N3 isoform X2	34.7	3	Fork head
Prkrir	52 kDa repressor of the inhibitor of the protein kinase isoform X1	34.7	4.3	THAP
Hmgxb4	HMG domain-containing protein 4 isoform X1	34.6	7.5	HMG
Smarcc1	SWI/SNF complex subunit SMARCC1	34.6	5.7	MYB
Zfp148	zinc finger protein 148 isoform X2	34.6	3.6	zf-C2H2
Hmgb3	high mobility group protein B3	33.9	1.7	HMG
Irf9	interferon regulatory factor 9 isoform 2	33.9	3.5	IRF
Atf6	cyclic AMP-dependent transcription factor ATF-6 alpha isoform X1	33.6	1.6	TF_bZIP
Zhx1	zinc fingers and homeoboxes protein 1	33.6	6	Homeobox
Zfp260	zinc finger protein 260 isoform X1	33.3	2.3	zf-C2H2
Pbx3	pre-B-cell leukemia transcription factor 3 isoform X2	33.2	8.2	Homeobox
Klf3	Krueppel-like factor 3 isoform X1	33.1	8.4	zf-C2H2
Smad3	mothers against decapentaplegic homolog 3 isoform X1	32.8	4.9	MH1
Zfp358	zinc finger protein 358 isoform X1	32.7	4.5	zf-C2H2

Zfp512	zinc finger protein 512 isoform X2	32.5	4.9	zf-C2H2
Thra	thyroid hormone receptor alpha isoform 1	32.3	5.4	THR-like
Tef	thyrotroph embryonic factor isoform X3	32.2	8.3	TF_bZIP
Cebpg	CCAAT/enhancer-binding protein gamma	32.1	3.5	C/EBP
Gtf2ird1	general transcription factor II-I repeat domain-containing protein 1 isoform j	32.1	8.9	GTF2I
E2f5	transcription factor E2F5 isoform X1	31.9	0.6	E2F
Zbtb42	zinc finger and BTB domain-containing protein 42 isoform X1	31.9	4.9	ZBTB
Ahr	aryl hydrocarbon receptor isoform 1	31.8	1.7	bHLH
Atf3	cyclic AMP-dependent transcription factor ATF-3	31.7	3.5	TF_bZIP
Nfyc	nuclear transcription factor Y subunit gamma isoform X2	31.4	2.6	NF-YC
Mef2a	myocyte-specific enhancer factor 2A isoform X2	31.3	5.2	SRF
Zfp655	zinc finger protein 655 isoform b	31.3	3.7	zf-C2H2
Zfp637	zinc finger protein 32 isoform X3	31.1	3	zf-C2H2
Zkscan17	zinc finger protein 496 isoform X3	30.9	0.7	zf-C2H2
Nr2c2	nuclear receptor subfamily 2 group C member 2	30.8	4.3	RXR-like
Zfp426	zinc finger protein 426 isoform X6	30.8	3.1	zf-C2H2
Zbtb7a	zinc finger and BTB domain-containing protein 7A	30.6	2.8	ZBTB
Zxdc	zinc finger protein ZXDC isoform 2	30.4	1.1	zf-C2H2
Klf11	Krueppel-like factor 11	30.3	1.9	zf-C2H2
Erf	ETS domain-containing transcription factor ERF	29.9	3.3	ETS
Zfp276	zinc finger protein 276 isoform X2	29.8	3.3	zf-C2H2
Elk4	ETS domain-containing protein Elk-4 isoform X3	29.2	3.8	ETS
Fiz1	flt3-interacting zinc finger protein 1	29.2	1.2	zf-C2H2
Zfp623	zinc finger protein 623	29.2	3.1	zf-C2H2

Hnf1b	hepatocyte nuclear factor 1-beta isoform 2	29.0	4.6	Homeobox
Arid4a	AT-rich interactive domain-containing protein 4A	28.8	2.6	ARID
Nfyb	nuclear transcription factor Y subunit beta	28.7	2.3	NF-YB
Nr3c1	glucocorticoid receptor	28.5	4.8	ESR-like
Baz2b	bromodomain adjacent to zinc finger domain protein 2B isoform X18	28.4	4.2	MBD
Zfp523	zinc finger protein 76 isoform X1	28.3	2.9	zf-C2H2
Arid4b	AT-rich interactive domain-containing protein 4B isoform X1	28.0	5.4	ARID
Hoxb2	homeobox protein Hox-B2 isoform X1	27.9	2.3	Homeobox
Maff	transcription factor MafF isoform X1	27.9	4.3	TF_bZIP
Stat3	signal transducer and activator of transcription 3 isoform 2	27.8	2.1	STAT
Baz2a	bromodomain adjacent to zinc finger domain protein 2A isoform X1	27.7	3	MBD
Zbtb20	zinc finger and BTB domain-containing protein 20 isoform X3	27.7	4.8	ZBTB
Zfp384	zinc finger protein 384 isoform X6	27.7	3.5	zf-C2H2
Klf16	Krueppel-like factor 16	27.5	2.8	zf-C2H2
Mafk	transcription factor MafK isoform X1	27.5	4.1	TF_bZIP
Nfya	nuclear transcription factor Y subunit alpha isoform a	27.4	6.5	NF-YA
Zfp692	zinc finger protein 692 isoform X1	27.3	0.7	zf-C2H2
Bcl6	B-cell lymphoma 6 protein homolog	27.1	4.1	ZBTB
Hinfp	histone H4 transcription factor isoform X2	27.0	1.9	zf-C2H2
Pias1	E3 SUMO-protein ligase PIAS1	27.0	1.8	zf-MIZ
Nfxl1	NF-X1-type zinc finger protein NFXL1 isoform X1	26.9	3.8	zf-NF-X1
Nr2c1	nuclear receptor subfamily 2 group C member 1	26.9	2.3	RXR-like
Bhlhe40	class E basic helix-loop-helix protein 40	26.7	11.8	bHLH
Pbx2	pre-B-cell leukemia transcription factor 2	26.5	1.6	Homeobox

Pias2	E3 SUMO-protein ligase PIAS2 isoform 3	26.4	3.3	zf-MIZ
Pbx1	pre-B-cell leukemia transcription factor 1 isoform a	26.2	6.9	Homeobox
Rara	retinoic acid receptor alpha isoform 1	26.2	3.6	THR-like
Hmbox1	homeobox-containing protein 1 isoform X8	26.0	8.3	Homeobox
Zfp809	zinc finger protein 809 isoform X3	26.0	1.5	zf-C2H2
Zfp251	zinc finger protein 251	25.9	2.4	zf-C2H2
Hmga2	high mobility group protein HMGI-C isoform X1	25.7	2	HMGI/HMGY
Six4	homeobox protein SIX4 isoform X1	25.6	2.4	Homeobox
Kdm5b	lysine-specific demethylase 5B isoform X2	25.4	4.5	ARID
Zfp131	zinc finger protein 131 isoform X2	25.2	1.5	ZBTB
Pias3	E3 SUMO-protein ligase PIAS3 isoform X1	24.8	6.4	zf-MIZ
Klf9	Krueppel-like factor 9	24.2	2.3	zf-C2H2
Zfp646	zinc finger protein 646 isoform X1	24.2	0.6	zf-C2H2
Hmga1-rs1	high mobility group protein HMG-I/HMG-Y isoform 2	24.1	1.1	HMGI/HMGY
Zbtb41	zinc finger and BTB domain-containing protein 41 isoform X1	24.1	1.1	ZBTB
Zfp397	zinc finger protein 397 isoform X1	24.1	2.7	zf-C2H2
Arnt	aryl hydrocarbon receptor nuclear translocator isoform X3	23.9	4	bHLH
Atf6b	cyclic AMP-dependent transcription factor ATF-6 beta	23.9	1.3	TF_bZIP
Zfp513	zinc finger protein 513 isoform X1	23.8	2.5	zf-C2H2
Zfx	zinc finger X-chromosomal protein isoform X4	23.7	1.8	zf-C2H2
Zbtb11	zinc finger and BTB domain-containing protein 11	23.6	0.6	ZBTB
Zfp292	zinc finger protein 292	23.6	2.1	zf-C2H2
Clock	circadian locomoter output cycles protein kaput isoform 1	23.5	1.6	bHLH
Zfp553	zinc finger protein 48 isoform X2	23.5	0.8	zf-C2H2

Srf	serum response factor isoform X2	23.3	0.6	SRF
Zbtb17	zinc finger and BTB domain-containing protein 17 isoform X1	23.2	1.3	ZBTB
Zfp746	zinc finger protein 746 isoform X10	23.2	1.9	zf-C2H2
Hmg20a	high mobility group protein 20A isoform X1	23.1	2.1	HMG
Zbtb24	zinc finger and BTB domain-containing protein 24 isoform 3	23.1	3.5	ZBTB
Foxm1	forkhead box protein M1	22.9	3.2	Fork head
Zscan25	zinc finger and SCAN domain-containing protein 25 isoform X3	22.7	3.1	zf-C2H2
E4f1	transcription factor E4F1 1	22.6	0.5	zf-C2H2
Zfp217	zinc finger protein 217 isoform X2	22.6	2.9	zf-C2H2
Zfp26	zinc finger protein 26 isoform X4	22.6	1.2	zf-C2H2
Gatad2b	transcriptional repressor p66-beta isoform X2	22.5	8	zf-GATA
Zfp213	zinc finger protein 213	22.5	1.9	zf-C2H2
Bach1	transcription regulator protein BACH1 isoform X1	22.4	1.7	TF_bZIP
Zfp281	zinc finger protein 281	22.3	1.1	zf-C2H2
Mybl2	myb-related protein B isoform X4	22.0	1.6	MYB
Zfp768	zinc finger protein 768	21.8	1.3	zf-C2H2
Zfp282	zinc finger protein 282 isoform X1	21.4	1.5	zf-C2H2
Atf1	cyclic AMP-dependent transcription factor ATF-1 isoform X1	21.3	2	TF_bZIP
Id1	DNA-binding protein inhibitor ID-1 isoform X1	21.3	9	bHLH
Usf2	upstream stimulatory factor 2 isoform X2	21.3	0.6	bHLH
Zfp672	zinc finger protein 672 isoform X1	21.3	0.7	zf-C2H2
E2f1	transcription factor E2F1 isoform b precursor	21.2	2.9	E2F
Foxp4	forkhead box protein P4 isoform 2	21.2	2.8	Fork head
Repin1	replication initiator 1 isoform d	21.2	1.7	zf-C2H2

Deaf1	deformed epidermal autoregulatory factor 1 homolog isoform X11	21.1	2.9	SAND
Zfp810	zinc finger protein 157 isoform X2	21.1	0.5	zf-C2H2
Foxc1	forkhead box protein C1	21.0	4.3	Fork head
Tead4	transcriptional enhancer factor TEF-3 isoform b	21.0	1.5	TEA
Ubp1	upstream-binding protein 1 isoform a	21.0	1.5	CP2
Zfp787	zinc finger protein 787 isoform X3	21.0	1.3	zf-C2H2
Mga	MAX gene-associated protein isoform X2	20.9	1.8	T-box
Zbtb6	zinc finger and BTB domain-containing protein 6	20.8	0.9	ZBTB
Zfp1	zinc finger protein 1 isoform X1	20.8	3.3	zf-C2H2
Zfp777	zinc finger protein 777 isoform X4	20.8	0.9	zf-C2H2
Zfp942	uncharacterized protein LOC73233	20.8	3.2	zf-C2H2
Nr1d2	nuclear receptor subfamily 1 group D member 2	20.6	2.8	THR-like
Zbtb38	zinc finger and BTB domain-containing protein 38 isoform X2	20.4	4.4	ZBTB
Arid1b	AT-rich interactive domain-containing protein 1B isoform X2	20.3	1.6	ARID
Zfp605	zinc finger protein 605	20.3	3.3	zf-C2H2
Ttf1	transcription termination factor 1 isoform X2	20.2	1.2	MYB
Cic	protein capicua homolog isoform X2	20.1	5	HMG
Mier3	mesoderm induction early response protein 3 isoform X3	20.1	0.9	MYB
Gzf1	GDNF-inducible zinc finger protein 1 isoform X2	20.0	1.1	ZBTB
Tfeb	transcription factor EB isoform X1	19.9	2.5	bHLH
Zkscan8	zinc finger protein with KRAB and SCAN domains 8 isoform 3	19.8	3.2	zf-C2H2
Zfp180	zinc finger protein 180 isoform X1	19.6	1.6	zf-C2H2
E2f8	transcription factor E2F8 isoform X1	19.5	3.4	E2F
Ovol1	putative transcription factor Ovo-like 1 isoform X2	19.5	0.6	zf-C2H2

Tada2a	transcriptional adapter 2-alpha isoform X3	19.5	1.1	MYB
Zfp800	zinc finger protein 800 isoform X1	19.5	1.3	zf-C2H2
Tfcp2	alpha-globin transcription factor CP2 isoform X5	19.4	1.5	CP2
Zfp516	zinc finger protein 516 isoform X1	19.4	3.2	zf-C2H2
Zfp943	uncharacterized protein LOC74670	19.4	2.4	zf-C2H2
Hmgxb3	HMG domain-containing protein 3 isoform X1	19.3	1	HMG
Tsc22d2	TSC22 domain family protein 2 isoform X3	19.3	4	TSC22
Zfp143	zinc finger protein 143	19.3	0.9	zf-C2H2
Zfp629	zinc finger protein 629 isoform X2	19.3	1.9	zf-C2H2
Zbtb44	zinc finger and BTB domain-containing protein 44 isoform X3	19.2	2.6	ZBTB
Tulp4	tubby-related protein 4 isoform b	19.1	5.8	Tub
Zfp618	zinc finger protein 618 isoform X9	18.9	3	zf-C2H2
Emx2	homeobox protein EMX2 isoform X1	18.7	3.9	Homeobox
Tfap4	transcription factor AP-4 isoform X1	18.6	3.1	bHLH
Zfp868	Kruppel-like zinc finger protein isoform X1	18.6	2.4	zf-C2H2
Foxj3	forkhead box protein J3 isoform X1	18.5	1	Fork head
Gli3	transcriptional activator GLI3 isoform X2	18.5	2.3	zf-C2H2
Rlf	zinc finger protein Rlf isoform X2	18.5	1.5	zf-C2H2
Zkscan6	zinc finger protein 18 isoform X2	18.5	1.6	zf-C2H2
Etv3	ETS translocation variant 3 isoform X1	18.4	1.4	ETS
Etv6	transcription factor ETV6 isoform X1	18.4	2.7	ETS
Tgif2	homeobox protein TGIF2 isoform X1	18.4	0.8	Homeobox
Zfp408	zinc finger protein 408 isoform X2	18.4	0.6	zf-C2H2
Arid1a	AT-rich interactive domain-containing protein 1A	18.2	6.8	ARID

Mef2d	myocyte-specific enhancer factor 2D isoform X4	18.2	3	SRF
Zbtb43	zinc finger and BTB domain-containing protein 43 isoform X2	18.2	1	ZBTB
Mlxip	MLX-interacting protein isoform 2	18.1	5.9	bHLH
Zfp707	zinc finger protein 707 isoform X1	18.1	2.1	zf-C2H2
Zfp961	uncharacterized protein LOC234413 isoform X1	18.1	3	zf-C2H2
610008E11Ri	uncharacterized protein LOC72128 isoform X2	18.0	2	zf-C2H2
Stat5b	signal transducer and activator of transcription 5B isoform X1	18.0	2.8	STAT
Zfp949	uncharacterized protein LOC71640 isoform X1	18.0	1.4	zf-C2H2
Pknox1	homeobox protein PKNOX1 isoform X3	17.9	1.4	Homeobox
Zfp422	zinc finger protein 22	17.9	0.7	zf-C2H2
Zbtb21	zinc finger and BTB domain-containing protein 21 isoform X1	17.7	1.3	ZBTB
Zbtb12	zinc finger and BTB domain-containing protein 12 isoform X1	17.5	1.3	ZBTB
Zfp524	zinc finger protein 524	17.5	0.5	zf-C2H2
Zmiz2	zinc finger MIZ domain-containing protein 2 isoform X5	17.5	3.1	zf-MIZ
Lcor	ligand-dependent corepressor isoform X2	17.4	2.7	HTH
Zfp160	zinc finger protein 160	17.4	1.7	zf-C2H2
Znf512b	zinc finger protein 512B	17.2	4.9	zf-C2H2
Zscan12	zinc finger and SCAN domain-containing protein 12 isoform X1	17.2	1.2	zf-C2H2
Zfp507	zinc finger protein 507 isoform X2	17.1	1.1	zf-C2H2
Zbtb14	zinc finger and BTB domain-containing protein 14 isoform X1	17.0	0.7	ZBTB
Zfp322a	zinc finger protein 322	17.0	2.7	zf-C2H2
Tfe3	transcription factor E3 isoform X2	16.9	1.3	bHLH
Mxi1	max-interacting protein 1 isoform X3	16.8	1.7	bHLH
Sim1	single-minded homolog 1 isoform X6	16.7	1.2	bHLH

Thap3	THAP domain-containing protein 3 isoform 2	16.7	1.3	THAP
D3Ertd254e	uncharacterized protein LOC241944	16.6	1.8	zf-C2H2
Fos	proto-oncogene c-Fos	16.3	4.7	TF_bZIP
Zfp51	zinc finger protein 51	16.3	0.4	zf-C2H2
Hoxa10	homeobox protein Hox-A10 isoform b	16.2	2.4	Homeobox
Snapc4	snRNA-activating protein complex subunit 4 isoform X5	16.2	1.3	MYB
Zbtb4	zinc finger and BTB domain-containing protein 4 isoform X1	16.2	3	ZBTB
Zfp12	zinc finger protein 12 isoform X1	16.2	2.2	zf-C2H2
Zscan2	zinc finger and SCAN domain-containing protein 2 isoform X1	16.2	2.7	zf-C2H2
Pax2	paired box protein Pax-2 isoform X6	16.1	4.4	PAX
Tfdp2	transcription factor Dp-2 isoform D	16.1	1	E2F
Six1	homeobox protein SIX1	16.0	0.9	Homeobox
Zfp212	zinc finger protein 212 isoform 2	16.0	2.8	zf-C2H2
Zfp688	zinc finger protein 688 isoform X2	15.9	1.2	zf-C2H2
Etv4	ETS translocation variant 4 isoform X5	15.8	2.1	ETS
Fosl2	fos-related antigen 2	15.8	6.9	TF_bZIP
Sp4	transcription factor Sp4 isoform X1	15.8	1.1	zf-C2H2
Zfp90	zinc finger protein 90 isoform X2	15.8	3.1	zf-C2H2
Hsf2	heat shock factor protein 2 isoform X2	15.7	1.9	HSF
Sox13	transcription factor SOX-13	15.7	0.9	HMG
E2f3	transcription factor E2F3 isoform E2f3a	15.6	1.6	E2F
E2f7	transcription factor E2F7 isoform X2	15.6	1.8	E2F
Zbtb2	zinc finger and BTB domain-containing protein 2 isoform X1	15.6	0.5	ZBTB
Klf13	Krueppel-like factor 13	15.5	2.8	zf-C2H2

Klf7	Krueppel-like factor 7 isoform X2	15.5	2.5	zf-C2H2
Nr1i3	nuclear receptor subfamily 1 group I member 3 isoform 3	15.4	1.8	THR-like
Zkscan14	zinc finger protein 394 isoform X1	15.4	1.1	zf-C2H2
Gmeb1	glucocorticoid modulatory element-binding protein 1	15.3	0.8	SAND
Terf2	telomeric repeat-binding factor 2 isoform 3	15.3	1.1	MYB
Zfp771	zinc finger protein 771	15.2	1.7	zf-C2H2
Zfp316	zinc finger protein 316 isoform X1	15.1	1.6	zf-C2H2
Zfp710	zinc finger protein 710 isoform X1	15.0	1.8	zf-C2H2
Zfp938	uncharacterized protein LOC237411 isoform X1	15.0	2.7	zf-C2H2
Pms1	PMS1 protein homolog 1 isoform X1	14.8	0.9	HMG
Rcor3	REST corepressor 3 isoform X3	14.8	1.9	MYB
Zfp932	zinc finger protein 431 isoform X3	14.7	3.2	zf-C2H2
Zfp944	uncharacterized protein LOC319615 isoform X1	14.7	2.4	zf-C2H2
Zbtb8a	zinc finger and BTB domain-containing protein 8A	14.6	0.5	ZBTB
Wiz	protein Wiz isoform X10	14.5	1.6	zf-C2H2
Rfx2	DNA-binding protein RFX2 isoform 1	14.3	2.1	RFX
Rfx7	DNA-binding protein RFX7	14.3	3.9	RFX
Setdb2	histone-lysine N-methyltransferase SETDB2 isoform 2	14.3	1.3	MBD
Zbtb25	zinc finger and BTB domain-containing protein 25 isoform X5	14.3	1.5	ZBTB
Hoxa9	homeobox protein Hox-A9 isoform 2	14.1	0.9	Homeobox
Smad1	mothers against decapentaplegic homolog 1 isoform X1	14.1	0.9	MH1
Zfp120	zinc finger protein 120 isoform 2 precursor	14.1	1.2	zf-C2H2
Runx1	runt-related transcription factor 1 isoform 3	13.9	3.1	Runt
Zfp236	zinc finger protein 236 isoform X8	13.9	1.4	zf-C2H2

Zfp61	zinc finger protein 155	13.9	0.4	zf-C2H2
Arntl	aryl hydrocarbon receptor nuclear translocator-like protein 1 isoform X7	13.8	0.2	bHLH
Plagl1	zinc finger protein PLAGL1	13.8	0.7	zf-C2H2
Smad7	mothers against decapentaplegic homolog 7 isoform X1	13.8	0.8	MH1
Dbp	D site-binding protein isoform X2	13.7	0.9	TF_bZIP
Zfp407	zinc finger protein 407 isoform X1	13.7	2.7	zf-C2H2
Zfp865	zinc finger protein 865 isoform 1	13.7	2	zf-C2H2
Dnajc1	dnaJ homolog subfamily C member 1 isoform X1	13.6	1.3	MYB
Hivep2	transcription factor HIVEP2 isoform X1	13.6	0.8	zf-C2H2
Mycn	N-myc proto-oncogene protein	13.6	2.1	bHLH
Nfil3	nuclear factor interleukin-3-regulated protein	13.6	1.5	TF_bZIP
Thap2	THAP domain-containing protein 2	13.6	1.6	THAP
Zfp956	uncharacterized protein LOC101197	13.6	1.3	zf-C2H2
Tshz1	teashirt homolog 1	13.5	1.7	zf-C2H2
Tada2b	transcriptional adapter 2-beta	13.4	2.1	MYB
Zfpm2	zinc finger protein ZFPM2	13.4	2.7	zf-C2H2
Rbak	RB-associated KRAB zinc finger protein isoform X2	13.3	0.3	zf-C2H2
Zfp568	zinc finger protein 568 isoform X1	13.2	0.1	zf-C2H2
Zkscan5	zinc finger protein with KRAB and SCAN domains 5 isoform X3	13.2	0.8	zf-C2H2
Gtf2ird2	general transcription factor II-I repeat domain-containing protein 2 isoform	13.0	2.6	GTF2I
Stat1	signal transducer and activator of transcription 1 isoform X1	13.0	0.9	STAT
Stat5a	signal transducer and activator of transcription 5A isoform X1	13.0	2	STAT
Zbed4	zinc finger BED domain-containing protein 4 isoform X1	13.0	1.2	zf-BED
E2f6	transcription factor E2F6 isoform X3	12.9	5.1	E2F

Fosl1	fos-related antigen 1	12.9	1.1	TF_bZIP
Zfp41	zinc finger protein 41 isoform X1	12.9	0.8	zf-C2H2
Zfp574	zinc finger protein 574 isoform X2	12.9	1.2	zf-C2H2
Zfp867	zinc finger protein 867 isoform X1	12.9	0.8	zf-C2H2
Zfp101	zinc finger protein 101	12.8	2.9	zf-C2H2
Zfp319	zinc finger protein 319	12.6	2.9	zf-C2H2
Zfp597	zinc finger protein 597 isoform X1	12.6	0.3	zf-C2H2
Zfp697	zinc finger protein 697 isoform X3	12.6	1.9	zf-C2H2
Grhl1	grainyhead-like protein 1 homolog isoform X3	12.5	2.4	CP2
Zfp592	zinc finger protein 592	12.5	1.1	zf-C2H2
Zfp946	zinc finger protein 946 isoform b	12.5	1.9	zf-C2H2
Rnf138	E3 ubiquitin-protein ligase RNF138 isoform X1	12.4	0.4	zf-MIZ
Zbtb37	zinc finger and BTB domain-containing protein 37 isoform X1	12.3	1.7	ZBTB
Foxo4	forkhead box protein O4 isoform X1	12.2	1	Fork head
Nfe2l3	nuclear factor erythroid 2-related factor 3	12.2	2.6	TF_bZIP
Nfic	nuclear factor 1 C-type isoform X1	12.2	2.6	CTF/NFI
Plagl2	zinc finger protein PLAGL2	12.2	1.6	zf-C2H2
Zfp113	zinc finger protein 3	12.2	1	zf-C2H2
Zfp748	zinc finger protein 748	12.2	0.4	zf-C2H2
Sp6	transcription factor Sp6 isoform X1	12.1	1.2	zf-C2H2
Zbtb26	zinc finger and BTB domain-containing protein 26	12.1	0.5	ZBTB
Zfp54	zinc finger protein 54	12.1	1.3	zf-C2H2
Zfp954	uncharacterized protein LOC232853	12.1	0.3	zf-C2H2
Foxp1	forkhead box protein P1 isoform X6	12.0	1.6	Fork head

Rfx5	DNA-binding protein Rfx5 isoform X2	12.0	0.7	RFX
Zfp526	zinc finger protein 526 isoform X2	11.9	1.2	zf-C2H2
Zfp110	neurotrophin receptor-interacting factor 1 isoform X1	11.8	1.9	zf-C2H2
Zfp606	zinc finger protein 606 isoform X1	11.8	0.9	zf-C2H2
Zfp617	zinc finger protein 617	11.8	1.4	zf-C2H2
Zfp654	zinc finger protein 654 isoform X4	11.8	1.7	zf-C2H2
Zfp808	zinc finger protein 80 isoform X2	11.8	0.8	zf-C2H2
Zfp715	zinc finger protein 715 isoform X2	11.7	0.8	zf-C2H2
Foxk1	forkhead box protein K1	11.6	3.9	Fork head
Irf8	interferon regulatory factor 8	11.6	1.1	IRF
Hoxa5	homeobox protein Hox-A5	11.5	1.6	Homeobox
Hoxb8	homeobox protein Hox-B8 isoform X1	11.5	1.1	Homeobox
Nfatc4	nuclear factor of activated T-cells, cytoplasmic 4 isoform 2	11.5	3.9	RHD
Zfp157	zinc finger protein 157 isoform X3	11.4	1.4	zf-C2H2
Zfp324	zinc finger protein 324A isoform X2	11.4	1.4	zf-C2H2
Zfp653	zinc finger protein 653 isoform 2	11.4	1.6	zf-C2H2
Mysm1	histone H2A deubiquitinase MYSM1	11.3	0.8	MYB
Nr4a1	nuclear receptor subfamily 4 group A member 1	11.3	3	NGFIB-like
Rbpj	recombining binding protein suppressor of hairless isoform 2	11.2	1.2	CSL
Sall2	sal-like protein 2 isoform 2	11.2	3	zf-C2H2
Tcf7l2	transcription factor 7-like 2 isoform 18	11.2	1.8	HMG
Foxa1	hepatocyte nuclear factor 3-alpha isoform X1	11.1	2.3	Fork head
Irf2	interferon regulatory factor 2 isoform X2	11.1	2	IRF
Zfp369	neurotrophin receptor-interacting factor 2	11.1	0.9	zf-C2H2

Zfp758	zinc finger protein 758 isoform X2	11.1	2	zf-C2H2
Prdm15	PR domain zinc finger protein 15 isoform X5	11.0	1	zf-C2H2
Zfp87	zinc finger protein 87	11.0	1.6	zf-C2H2
Arid3a	AT-rich interactive domain-containing protein 3A isoform X1	10.9	1.2	ARID
Relb	transcription factor RelB isoform X1	10.9	0.9	RHD
Tead1	transcriptional enhancer factor TEF-1 isoform X7	10.9	6.8	TEA
Lcorl	ligand-dependent nuclear receptor corepressor-like protein isoform 1	10.8	2.6	HTH
Zfp46	zinc finger protein 436 isoform X1	10.8	0.4	zf-C2H2
Zfp719	zinc finger protein 719 isoform X1	10.8	0.9	zf-C2H2
Smad6	mothers against decapentaplegic homolog 6 isoform X1	10.7	2.1	MH1
Zfp275	zinc finger protein 275 isoform X1	10.6	2.8	zf-C2H2
Pou2f1	POU domain, class 2, transcription factor 1 isoform X2	10.4	1.9	Pou
Tfap2a	transcription factor AP-2-alpha isoform 1	10.4	2.1	AP-2
Mbd4	methyl-CpG-binding domain protein 4	10.3	0.1	MBD
Pou6f1	POU domain, class 6, transcription factor 1 isoform X7	10.3	1.7	Pou
Stat2	signal transducer and activator of transcription 2 isoform X3	10.3	1.9	STAT
Zfp37	zinc finger protein 37 isoform X2	10.3	0.9	zf-C2H2
Elf4	ETS-related transcription factor Elf-4	10.2	2.7	ETS
Homez	homeobox and leucine zipper protein Homez isoform X4	10.2	1.4	Homeobox
Zfp65	zinc finger protein 71, related sequence	10.2	0.6	zf-C2H2
Mecp2	methyl-CpG-binding protein 2 isoform 1	10.1	1.5	MBD
Arid5b	AT-rich interactive domain-containing protein 5B isoform X4	10.0	3.3	ARID
Foxj2	forkhead box protein J2	10.0	0.9	Fork head
Zfp472	zinc finger protein 472	10.0	0.6	zf-C2H2

Zfp668	zinc finger protein 668 isoform X1	10.0	1.4	zf-C2H2
Plag1	zinc finger protein PLAG1 isoform X1	9.9	0.9	zf-C2H2
Zfp35	zinc finger protein 271	9.9	1.6	zf-C2H2
Mybl1	myb-related protein A isoform X3	9.8	1.6	MYB
Zbtb16	zinc finger and BTB domain-containing protein 16 isoform X1	9.8	1.9	ZBTB
Zfp846	zinc finger protein 846	9.6	0.6	zf-C2H2
Zscan22	zinc finger and SCAN domain-containing protein 22 isoform a	9.6	1.4	zf-C2H2
Atf7	cyclic AMP-dependent transcription factor ATF-7 isoform 1	9.5	2	TF_bZIP
Foxo1	forkhead box protein O1	9.5	1.4	Fork head
Gmeb2	glucocorticoid modulatory element-binding protein 2	9.5	0.7	SAND
Jarid2	protein Jumonji isoform X3	9.5	0.5	ARID
Mxd1	max dimerization protein 1 isoform X1	9.5	1.9	bHLH
Rere	arginine-glutamic acid dipeptide repeats protein isoform X10	9.5	3.6	zf-GATA
Zfp790	zinc finger protein 790 isoform X1	9.5	0.3	zf-C2H2
Zfhx3	zinc finger homeobox protein 3	9.4	3.1	Homeobox
Zfp444	zinc finger protein 444 isoform X1	9.4	0.9	zf-C2H2
Zscan29	zinc finger and SCAN domain-containing protein 29 isoform X1	9.4	1.2	zf-C2H2
Sox12	transcription factor SOX-12	9.3	1.2	HMG
Zfp229	zinc finger protein 229	9.2	1.6	zf-C2H2
Zfp764	zinc finger protein 764 isoform 2	9.2	0.7	zf-C2H2
Elk1	ETS domain-containing protein Elk-1	9.1	0.2	ETS
Nr2f2	COUP transcription factor 2 isoform 2	9.1	1.7	RXR-like
Meis2	homeobox protein Meis2 isoform 15	9.0	1	Homeobox
Prdm2	PR domain zinc finger protein 2 isoform a	9.0	1.6	zf-C2H2

Zfp27	zinc finger protein 27 isoform X1	9.0	0.1	zf-C2H2
Zbtb45	zinc finger and BTB domain-containing protein 45 isoform X1	8.9	1.3	ZBTB
Zfp169	zinc finger protein 169 isoform X1	8.9	1.3	zf-C2H2
Rfx1	MHC class II regulatory factor RFX1 isoform X1	8.7	1.4	RFX
Rreb1	ras-responsive element-binding protein 1 isoform 2	8.7	1.7	zf-C2H2
Zfat	zinc finger protein ZFAT isoform X3	8.7	1.6	zf-C2H2
Zfp788	zinc finger protein 788 isoform X4	8.7	0.5	zf-C2H2
Irx2	iroquois-class homeodomain protein IRX-2	8.6	1.4	Homeobox
Meis3	homeobox protein Meis3 isoform b	8.6	3.4	Homeobox
Six5	homeobox protein SIX5 isoform X1	8.6	0.5	Homeobox
Zbtb39	zinc finger and BTB domain-containing protein 39	8.6	1.2	ZBTB
Zfp398	zinc finger protein 398 isoform X2	8.6	0.5	zf-C2H2
Ebf4	transcription factor COE4	8.5	2.7	COE
Foxn2	forkhead box protein N2 isoform X2	8.5	1	Fork head
Zfp184	zinc finger protein 184 isoform X2	8.5	1.6	zf-C2H2
Zfp58	zinc finger protein 58	8.4	1.5	zf-C2H2
Zfpm1	zinc finger protein ZFPM1	8.4	2.5	zf-C2H2
Zbtb48	zinc finger and BTB domain-containing protein 48 isoform X3	8.3	0.5	ZBTB
Zfp142	zinc finger protein 142 isoform X3	8.3	0.9	zf-C2H2
Zfp599	zinc finger-like protein isoform X1	8.3	0.1	zf-C2H2
Zmiz1	zinc finger MIZ domain-containing protein 1 isoform X1	8.3	4.8	zf-MIZ
Tulp3	tubby-related protein 3 isoform X1	8.2	1.9	Tub
Zfp579	zinc finger protein 579	8.2	0.5	zf-C2H2
Zbtb32	zinc finger and BTB domain-containing protein 32	8.1	2	ZBTB

Ikzf2	zinc finger protein Helios isoform X6	8.0	1.6	zf-C2H2
Zfp560	zinc finger protein 778	8.0	1	zf-C2H2
Zfp442	zinc finger protein 442 isoform X2	7.8	0.8	zf-C2H2
Zfp729a	zinc finger protein 729a	7.8	0.9	zf-C2H2
Zfp729b	zinc finger protein 729b	7.8	0.3	zf-C2H2
Zkscan7	zinc finger protein with KRAB and SCAN domains 7 isoform X2	7.8	0.4	zf-C2H2
Hivep1	zinc finger protein 40	7.6	1.5	zf-C2H2
Zbtb49	zinc finger and BTB domain-containing protein 49	7.6	1.4	ZBTB
Zfp874a	zinc finger protein 874 isoform X1	7.6	1.2	zf-C2H2
Zfp964	zinc finger-like protein isoform X1	7.6	1.1	zf-C2H2
Zfp362	zinc finger protein 362	7.5	1.5	zf-C2H2
130023H24Ri	GLI-Kruppel family member GLI4	7.4	0.3	zf-C2H2
Prdm10	PR domain zinc finger protein 10 isoform X7	7.4	1.4	zf-C2H2
Cers6	ceramide synthase 6 isoform X2	7.3	3	Homeobox
Mnt	max-binding protein MNT isoform X2	7.3	0.9	bHLH
Zfp827	zinc finger protein 827 isoform X12	7.3	1.7	zf-C2H2
Tcf4	transcription factor 4	7.2	1.8	bHLH
Zfp760	zinc finger protein 760	7.1	0.6	zf-C2H2
Myb	transcriptional activator Myb isoform 1	7.0	1.1	MYB
Ncor2	nuclear receptor corepressor 2 isoform X23	7.0	3.4	MYB
Zfp458	zinc finger protein 728 isoform X2	7.0	1.9	zf-C2H2
Zfp933	uncharacterized protein LOC242747 isoform X1	6.9	0.9	zf-C2H2
Zbtb40	zinc finger and BTB domain-containing protein 40 isoform X2	6.8	0.6	ZBTB
Zfp661	zinc finger protein 2	6.8	0.5	zf-C2H2

Nfix	nuclear factor 1 X-type isoform X8	6.7	2.8	CTF/NFI
Ppard	peroxisome proliferator-activated receptor delta	6.7	1.1	THR-like
Sp8	transcription factor Sp8 isoform X2	6.7	0.9	zf-C2H2
Ovol2	transcription factor Ovo-like 2 isoform X1	6.6	0.8	zf-C2H2
Rcor2	REST corepressor 2 isoform X1	6.6	1	MYB
Mtf1	metal regulatory transcription factor 1	6.5	0.4	zf-C2H2
Zfp738	zinc finger protein 738 isoform X2	6.5	0.3	zf-C2H2
AW146154	uncharacterized protein LOC101835	6.3	0.9	zf-C2H2
Rsl1	regulator of sex limited protein 1	6.3	0.8	zf-C2H2
Zfp691	zinc finger protein 691	6.3	0.6	zf-C2H2
Zfp747	zinc finger protein 747	6.3	0.3	zf-C2H2
Zfp770	zinc finger protein 770 isoform X1	6.3	0.4	zf-C2H2
4430033K04Ri	uncharacterized protein LOC243308	6.2	1.1	zf-C2H2
Dmrta2	doublesex- and mab-3-related transcription factor A2 isoform X1	6.2	0.3	DM
Prdm5	PR domain zinc finger protein 5	6.2	0.5	zf-C2H2
Sp2	transcription factor Sp2 isoform 2	6.2	1.8	zf-C2H2
Tbx3	T-box transcription factor TBX3 isoform X1	6.1	1.9	T-box
Zfp111	zinc finger protein 111 isoform 2	6.1	0.3	zf-C2H2
Nr6a1	nuclear receptor subfamily 6 group A member 1 isoform 3	6.0	0.3	GCNF-like
Zbtb3	zinc finger and BTB domain-containing protein 3 isoform X2	6.0	0.4	ZBTB
Zfp39	zinc finger protein 39	6.0	0.8	zf-C2H2
Zfp3	zinc finger protein 3	5.9	0.6	zf-C2H2
Zfp784	zinc finger protein 784	5.8	1.2	zf-C2H2
Nfatc2	nuclear factor of activated T-cells, cytoplasmic 2 isoform e	5.7	2.1	RHD

Pbx4	pre-B-cell leukemia transcription factor 4	5.7	1.6	Homeobox
Zbtb8b	zinc finger and BTB domain-containing protein 8B isoform X1	5.7	0.2	ZBTB
Zfp651	zinc finger and BTB domain-containing protein 47 isoform X1	5.7	2	ZBTB
Zfp74	zinc finger protein 569 isoform X1	5.7	0.6	zf-C2H2
Klf2	Krueppel-like factor 2	5.6	0.8	zf-C2H2
Sox6	transcription factor SOX-6 isoform 4	5.6	2.3	HMG
Tcf7l1	transcription factor 7-like 1 isoform 1	5.6	1.5	HMG
Zfp11	zinc finger protein 11	5.6	0.5	zf-C2H2
Zfp947	zinc finger protein 947	5.6	1	zf-C2H2
Osr1	protein odd-skipped-related 1	5.5	0.5	zf-C2H2
Prox2	prospero homeobox protein 2 isoform X2	5.5	0.9	HPD
Zfp429	zinc finger protein 429	5.5	0.3	zf-C2H2
Zfp382	zinc finger protein 382 isoform X3	5.4	1	zf-C2H2
Nr1d1	nuclear receptor subfamily 1 group D member 1	5.3	1.2	THR-like
Zfp791	zinc finger protein 791 isoform X1	5.3	1.5	zf-C2H2
Camta2	calmodulin-binding transcription activator 2 isoform 4	5.2	0.9	CG-1
Dmrt2	doublesex- and mab-3-related transcription factor 2	5.2	0.9	DM
Irf7	interferon regulatory factor 7 isoform X1	5.2	0.7	IRF
Barx2	homeobox protein BarH-like 2	5.1	1.7	Homeobox
Rfx3	transcription factor RFX3 isoform X3	5.1	1.4	RFX
Egr2	E3 SUMO-protein ligase EGR2	5.0	1.4	zf-C2H2
Zfp763	zinc finger protein 763	5.0	1.6	zf-C2H2
Zfp94	zinc finger protein 45 isoform X1	5.0	0.7	zf-C2H2
Zfp628	zinc finger protein 628	4.9	0.1	zf-C2H2

Zfp772	zinc finger protein 419	4.9	0.3	zf-C2H2
Zfp57	zinc finger protein 57 isoform 2	4.8	1.1	zf-C2H2
Zfp820	zinc finger protein 820	4.8	0.5	zf-C2H2
Zfp952	uncharacterized protein LOC240067 isoform X1	4.8	0.8	zf-C2H2
Zhx2	zinc fingers and homeoboxes protein 2 isoform X1	4.7	0.5	Homeobox
Gm14305	predicted gene, 100043387	4.6	0.2	zf-C2H2
Hic2	hypermethylated in cancer 2 protein	4.6	0.9	ZBTB
Zfp13	zinc finger protein 13	4.6	0.7	zf-C2H2
Zfp72	zinc finger protein 72 isoform X2	4.5	0.5	zf-C2H2
Zfp874b	zinc finger protein 874b isoform X2	4.5	0.5	zf-C2H2
Eomes	eomesodermin homolog isoform X1	4.3	0.3	T-box
Foxp3	forkhead box protein P3	4.3	0.1	Fork head
Zfp296	zinc finger protein 296	4.3	1	zf-C2H2
Zfp595	zin finger protein 595 isoform X2	4.3	0.5	zf-C2H2
Zfp40	zinc finger protein 40 isoform X3	4.2	0.6	zf-C2H2
Zfp473	zinc finger protein 473 homolog isoform X3	4.2	0.7	zf-C2H2
Zfp708	zinc finger protein 708 isoform d	4.2	0.5	zf-C2H2
Hoxa3	homeobox protein Hox-A3 isoform X1	4.1	0.5	Homeobox
Otx1	homeobox protein OTX1 isoform X1	4.1	0.9	TF_Otx
Zfp248	zinc finger protein 248 isoform X2	4.0	0.7	zf-C2H2
Zfp953	zinc finger protein 953	4.0	0.6	zf-C2H2
Zscan20	zinc finger and SCAN domain-containing protein 20 isoform X5	4.0	0.1	zf-C2H2
Zbtb34	zinc finger and BTB domain-containing protein 34 isoform X2	3.9	0.5	ZBTB
Zfp273	zinc finger protein 273	3.9	0.3	zf-C2H2

Zfp551	zinc finger protein 551	3.9	0.5	zf-C2H2
Zfp677	KRAB-zinc finger protein	3.9	0.4	zf-C2H2
Prdm9	histone-lysine N-methyltransferase PRDM9 isoform X1	3.8	0.7	zf-C2H2
Zfp945	uncharacterized protein LOC240041 isoform X1	3.7	0.2	zf-C2H2
Nr3c2	mineralocorticoid receptor	3.6	1.1	ESR-like
Zfp141	zinc finger protein 141 isoform 1	3.6	0.2	zf-C2H2
Zfp85	zinc finger protein 85	3.6	0.6	zf-C2H2
Crem	cAMP-responsive element modulator isoform 16	3.5	1.1	TF_bZIP
Zfp82	zinc finger protein 82 isoform 3	3.5	1.2	zf-C2H2
Zfp963	zinc finger protein 669-like	3.5	0.5	zf-C2H2
Bhlhe41	class E basic helix-loop-helix protein 41 isoform 2	3.4	0.2	bHLH
Zfp128	zinc finger protein 8	3.4	0.6	zf-C2H2
Zfp189	zinc finger protein 189	3.4	1.1	zf-C2H2
Zfp418	zinc finger protein 418	3.4	0.3	zf-C2H2
Zfp566	zinc finger protein 566	3.4	0.8	zf-C2H2
BC025920	cDNA sequence BC025920	3.3	0.5	zf-C2H2
Esr1	estrogen receptor isoform 1	3.3	0.7	ESR-like
Ybx2	Y-box-binding protein 2 isoform X5	3.3	1.4	CSD
Zfp939	zinc finger protein 939 isoform X4	3.3	0.5	zf-C2H2
Zfp960	zinc finger protein 960 isoform 2	3.3	0.8	zf-C2H2
Arid5a	AT-rich interactive domain-containing protein 5A isoform X1	3.2	0.5	ARID
Rel	proto-oncogene c-Rel	3.2	0.6	RHD
Tal1	T-cell acute lymphocytic leukemia protein 1 homolog	3.2	1.4	bHLH
Zfp759	zinc finger protein 759 isoform X1	3.2	0.6	zf-C2H2

Cux2	homeobox protein cut-like 2 isoform X6	3.1	0.4	CUT
Nfatc1	nuclear factor of activated T-cells, cytoplasmic 1 isoform 5	3.1	0.7	RHD
Twist1	twist-related protein 1	3.1	2.2	bHLH
Zfp420	zinc finger protein 420 isoform X1	3.0	0.7	zf-C2H2
Gm5595	predicted gene 5595	2.9	0.2	zf-C2H2
Arntl2	aryl hydrocarbon receptor nuclear translocator-like protein 2 isoform X1	2.8	0.7	bHLH
Sox9	transcription factor SOX-9	2.8	0.3	HMG
Zfhx2	zinc finger homeobox protein 2 isoform X3	2.8	0.8	Homeobox
Zfp329	zinc finger protein 329 isoform X2	2.8	0.3	zf-C2H2
Zfp341	zinc finger protein 341 isoform X1	2.8	0.6	zf-C2H2
Zfp775	zinc finger protein 775 isoform X1	2.8	0.5	zf-C2H2
Zfp174	zinc finger protein 174 isoform X1	2.7	0.4	zf-C2H2
Zfp455	zinc finger protein 455	2.7	0.3	zf-C2H2
Dlx1	homeobox protein DLX-1 isoform X1	2.6	0.9	Homeobox
Yy2	transcription factor YY2	2.6	0.3	zf-C2H2
Nr4a2	nuclear receptor subfamily 4 group A member 2	2.5	0.3	NGFIB-like
E2f2	transcription factor E2F2 isoform 2	2.4	0.2	E2F
Etv5	ETS translocation variant 5 isoform X1	2.4	0.4	ETS
Zbtb46	zinc finger and BTB domain-containing protein 46 isoform X3	2.4	1.5	ZBTB
Zfhx4	zinc finger homeobox protein 4 isoform X1	2.4	0.8	Homeobox
Zfp28	zinc finger protein 28	2.3	0.4	zf-C2H2
Zfp446	zinc finger protein 446 isoform X2	2.3	0.6	zf-C2H2
Zxdb	zinc finger X-linked protein ZXDB	2.3	0.2	zf-C2H2
Tbx2	T-box transcription factor TBX2	2.2	0.6	T-box

Zfp202	zinc finger protein 202 isoform X3	2.2	0.2	zf-C2H2
Zik1	zinc finger protein interacting with ribonucleoprotein K	2.2	0.2	zf-C2H2
130019O22Ri	RIKEN cDNA 9130019O22 gene	2.1	0.2	zf-C2H2
Mycl	protein L-Myc isoform X1	2.1	0.2	bHLH
Pax9	paired box protein Pax-9 isoform X1	2.1	0.9	PAX
Zfp97	zinc finger protein 97	2.1	0.5	zf-C2H2
Myt1l	myelin transcription factor 1-like protein isoform 3	2.0	1.4	zf-C2HC
Tcf24	transcription factor 24 isoform X1	2.0	0.5	bHLH
Zfp658	zinc finger protein 658 isoform X1	2.0	0.3	zf-C2H2
Zfp456	zinc finger protein 456	1.9	0.1	zf-C2H2
Zfp712	zinc finger protein 712	1.9	0.5	zf-C2H2
Gata2	endothelial transcription factor GATA-2	1.6	1.5	zf-GATA
Gata4	transcription factor GATA-4 isoform 1	1.5	1.2	zf-GATA
Vdr	vitamin D3 receptor	1.5	0.5	THR-like
Satb2	DNA-binding protein SATB2	1.4	0.2	CUT
Gm13251	predicted gene 13251	1.3	0.3	zf-C2H2
Myrf	myelin regulatory factor isoform X2	1.3	0.4	NDT80/PhoG
Prdm8	PR domain zinc finger protein 8 isoform X1	1.3	0.3	zf-C2H2
Zfp941	uncharacterized protein LOC407812	1.3	1.1	zf-C2H2
Rora	nuclear receptor ROR-alpha isoform X4	1.1	0.4	THR-like
Zfp619	zinc finger protein 91	1.1	0.2	zf-C2H2
Camta1	calmodulin-binding transcription activator 1 isoform 3	1.0	0.1	CG-1
Nfia	nuclear factor 1 A-type isoform X5	1.0	0.5	CTF/NFI