

## **Supplementary Information Guide**

(1) Contains: Supplementary tables 1-3

(2) Description: 1 PDF file

**Supplementary Table 1.** Validated, robust alveolar epithelial cell markers.

**Supplementary Table 2.** Percentiles of receptor genes expressed by bipotent progenitors and LysM-lineage alveolar type 2 (AT2) cells; and expression levels of EGF receptor family members with histograms of probe-specific levels.

**Supplementary Table 3.** Genes highly selectively expressed by bipotent progenitors and LysM-lineage alveolar type 2 (AT2) cells at the 90<sup>th</sup> percentile or higher; and annotation enrichment analysis for these gene profiles.

**Supplementary Table 1.** Validated, robust alveolar epithelial cell markers

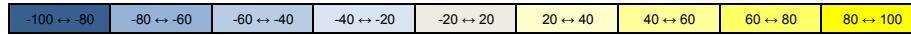
AT1 Markers	
Antigen or Lectin (synonym)	Reference
Ager (Rage)	Fehrenbach et al. 1998
Aqp5	Nielsen et al. 1997
LEL	Bankston et al. 1991
Pdpn (T1a)	Rishi et al. 1995
RCA I	Dobbs et al. 1985
AT2 Markers	
Antigen (synonym)	Reference
Abca3	Mulugeta et al. 2002
Ctsh	Ishii et al. 1991
Lamp-1, Lamp-2	Salaun et al. 2004
Lyz2 (LysM)	Singh et al. 1988
Muc1	Jarrard et al. 1998
Nkx2.1 (Ttf-1)*	Ikeda et al. 1995
SftpB	Kalina et al. 1992
SftpC	Beers et al. 1992
SftpD	Crouch et al. 1991

\* Low level expression observed in AT1 cells

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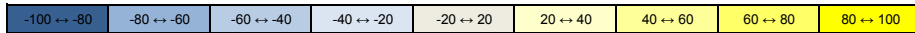
a

Receptor expression in bipotent progenitors (BP) and AT2 cells relative to cells in GEXC

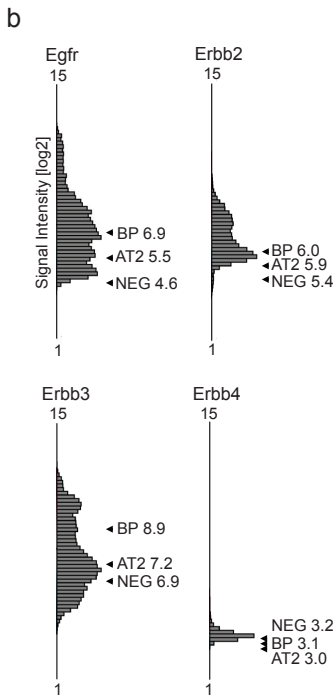


Gene	BP			AT2			Gene	BP			AT2			Gene	BP			AT2									
	1	2	3	1	2	3		1	2	3	1	2	3		1	2	3	1	2	3							
<b>Cytokine</b>																											
Epor	-70	-68	-65	-53	-81	-76	Ednrb	82	88	83	-82	-42	-61	Gpr26	-16	-23	-43	13	50	-41	Prokr2	-61	-81	-92	-66	-85	-58
Ghr	36	39	30	3	-31	-39	Npy1r	-71	-43	-64	-54	-75	-55	Gpr27	-76	-71	-58	-77	-35	-38	Ptadr	-39	-38	-25	-3	-10	-15
Mpl	-55	-63	-41	-59	-47	-34	Npy2r	-2	-1	-19	-62	-6	-22	Gpr3	-31	-23	-71	-16	24	-2	Ptger1	-13	-43	-35	-13	62	-19
Pdfr	-55	-57	42	-17	0	-19	Npy5r	-60	-54	-78	-30	-52	-73	Gpr30	-1	-1	-40	-30	-34	-52	Ptger2	-40	-13	-3	-32	86	8
Csf3r	15	41	67	0	89	89	Npy6r	-48	-65	-66	-82	-25	-23	Gpr33	-65	-83	-41	92	-4	-84	Ptger3	61	59	64	12	27	47
Il12rb1	-89	-87	-75	-40	-16	-6	Ghr	-79	-57	-98	-55	-14	-78	Gpr34	24	4	-4	-17	-57	-5	Ptger4	43	41	31	-13	-8	-9
Il12rb2	-94	-54	-73	-46	-70	-51	Tshr	-39	-44	-55	-71	-23	-56	Gpr35	76	71	91	82	85	96	Ptger5	33	35	53	93	73	68
Il27ra	-47	-58	-65	-47	2	19	Rxfp1	-57	-90	-96	-83	-99	-31	Gpr37	-89	-77	-88	-42	-37	-86	Ptger6	-55	-82	-65	-78	-19	-67
Il6st	48	48	23	48	3	12	Rxfp2	-24	-45	-10	-57	-9	-11	Gpr371	-62	-75	-66	-70	-75	-57	Ptger7	-37	-53	-30	11	86	80
Lepr	23	18	-20	29	-21	-12	Adora1	-5	18	-26	-31	-62	-31	Gpr39	-95	-89	-73	-26	-63	-83	Qrpr	-55	-82	-90	-67	-64	-99
Lifr	46	47	42	28	5	25	Adora2a	-75	-75	-73	-59	17	-38	Gpr4	-10	0	-75	20	-48	-33	Rho	-26	-66	-46	-22	-36	-56
Cntrf	-56	-51	-78	75	-43	-61	Adora2b	87	86	97	88	77	90	Gpr44	-58	-80	-79	-25	-20	-58	Rh	-40	-73	-31	-56	-44	-44
Crf1	55	60	60	10	-16	-51	Adora3	-3	-5	-2	-11	-2	-18	Gpr45	-28	-74	-44	-70	-8	-29	S1pr1	25	32	32	82	-1	16
Ebi3	33	26	64	55	27	54	Adora1a	-19	-58	-54	-37	39	-46	Gpr50	12	-16	-38	-76	0	-15	S1pr2	92	89	68	-21	96	67
Il12b	-42	-28	-8	87	-1	13	Adra1b	99	83	83	-47	-34	-66	Gpr6	-90	-96	-83	-51	-21	-20	S1pr3	68	67	32	-73	6	-35
Il6ra	89	99	92	95	100	99	Adra2a	-7	1	-16	-1	-19	-27	Gpr61	-38	-71	-74	-75	-87	-51	S1pr4	-9	-9	7	-7	86	77
Crf2	43	33	76	91	100	95	Adra2b	-74	-72	-33	-32	42	-17	Gpr62	-63	-81	-62	-58	-5	-46	Sstr1	-95	-76	-76	-77	-41	-33
Csf2rb	85	83	98	94	82	87	Adra2c	-24	-78	-20	-45	4	2	Gpr63	-25	-50	-9	5	36	-6	Sstr2	-47	-63	-61	-24	-55	-29
Csf2rb2	64	60	80	81	55	66	Adrb1	37	55	28	76	15	-1	Gpr65	52	47	74	86	88	86	Sstr3	-96	-82	-73	-27	-53	-25
Il21r	-36	-39	-10	-6	47	50	Adrb2	65	65	54	33	29	23	Gpr68	-81	-88	-72	36	-2	7	Sstr4	0	-4	-33	-56	-17	4
Il2rb	-49	-77	-73	-68	-22	-21	Adrb3	-71	-47	-60	-74	-80	-66	Gpr75	-85	-98	-69	-44	-34	-70	Sstr5	-17	5	-68	-22	-15	-10
Il4ra	42	43	68	55	54	80	Agtr1a	-14	-14	-49	-6	-70	-35	Gpr81	-66	-68	-70	-75	-84	-90	Sucnr1	-88	-69	-25	-34	-48	-93
Il7r	-3	-4	16	50	64	52	Agtr1b	74	77	11	-71	-12	-74	Gpr83	-79	-73	-57	-95	-12	-40	Tacr1	-39	-73	-31	-70	-27	-38
Il9r	-15	-23	-72	-61	-66	-46	Agtr2	20	9	0	-61	-14	-66	Gpr84	6	0	53	-7	-3	0	Tacr2	-43	-20	-59	-28	-33	-71
Csf2ra	67	67	85	87	70	87	Aplnr	74	88	-10	-47	11	-23	Gpr85	-3	-62	-19	-13	-67	-56	Tacr3	-80	-48	-77	-91	-43	-65
Il13ra1	88	87	90	93	100	96	Avpr1a	-71	-56	-78	-92	-22	-40	Gpr87	-77	-80	-74	-87	-69	-76	Tbxar2	67	70	-13	-22	14	21
Il2rg	28	31	31	56	85	61	Avpr1b	-60	-76	-84	-42	-47	-54	Gpr88	-4	-7	-24	-48	-24	-31	Trhr	-67	-60	-74	-97	-24	-55
Il3ra	-25	-30	-31	-53	52	5	Avpr2	-72	-79	-70	-41	-23	-73	Grpr	-45	-40	-31	-88	-3	-27	Uts2r	-50	-69	-29	-8	-24	-68
Il5ra	-74	-45	-79	-56	-19	-52	Bdkrb1	-76	-79	-91	-67	-25	-53	Hcrt1	-18	-44	-43	-17	-67	-27	Cxcr3	-34	-22	-26	50	23	31
Crf3	25	26	66	57	71	74	Bdkrb2	-7	-17	-54	-86	-30	-70	Hcrt2	74	34	17	-31	62	34	Cxcr4	26	12	50	21	87	72
Il10ra	56	55	92	92	77	97	Brs3	-32	-61	-63	-59	46	20	Hmh1	-90	-88	-93	-74	-97	-68	Cxcr5	-63	-63	-29	-23	53	15
Il10rb	25	18	64	61	50	79	Cobp2	-3	-2	-54	-71	-47	-56	Hmh2	-41	-74	-49	22	67	70	Cxcr6	-64	-60	-84	-18	-34	-1
Il20ra	-58	-75	-66	-64	-67	-69	Cckar	14	18	-2	93	-7	-12	Hmh3	-70	-58	-68	-52	-25	-60	Cxcr7	74	72	36	26	9	-9
Il22ra2	-22	-69	-27	-11	-8	-8	Cckbr	-67	-71	-84	-90	-47	-49	Hmh4	-23	-42	39	-26	37	-27	Cxcr2	41	57	98	-4	99	99
Il28ra	-76	-64	-73	-50	-4	51	Ccr10	-30	-23	-32	98	86	99	Htr1a	-70	-64	-44	-23	-6	-14	Fam188a	-19	-27	67	-11	29	27
Ifnar1	-27	-24	-43	-3	0	27	Ccr9	-15	-18	-7	7	71	57	Htr1b	-40	-32	-59	-46	23	-49	Fpr2	77	76	84	51	66	74
Ifnar2	76	72	85	35	99	91	Chrm1	-85	-69	-61	-58	-51	-52	Htr1d	-91	-80	-49	-30	-12	-63	Fpr-rs3	-43	-40	-59	-46	71	-32
Chrm3	-80	-69	-56	-88	-57	-4	Chrm3	-80	-69	-56	-88	-57	-4	Htr1f	-78	-94	-78	-46	-9	-53	Fpr-rs4	8	-33	-32	-61	48	-22
Chrm4	-57	-71	-72	-29	-52	-32	Chrm4	-57	-71	-72	-29	-52	-32	Htr2b	-63	-62	-69	-82	-59	-51	Gcap14	31	36	36	85	36	53
Cnr1	-35	-67	-88	-77	-71	-64	Cnr1	-35	-67	-88	-77	-71	-64	Htr2c	-23	-31	-42	-3	-4	-12	Gmp266	-15	-19	-28	-78	-39	-95
Cnr2	43	43	52	15	71	88	Cnr2	43	43	52	15	71	88	Htr4	-70	-78	-41	-51	-74	-69	Gpr151	-85	-62	-97	-83	-28	-62
Cx3cr1	97	95	98	51	96	98	Cx3cr1	97	95	98	51	96	98	Htr5a	-34	-60	-87	-34	-2	-39	Gpr153	-17	-25	-27	-70	-31	-64
Cyslr1	34	39	59	67	29	47	Cyslr1	34	39	59	67	29	47	Htr5b	-73	-56	-50	-62	-43	-77	Gpr165	-11	10	-31	-36	24	3
Cyslr2	-61	-62	-66	-47	-16	-15	Cyslr2	-61	-62	-66	-47	-16	-15	Htr6	-73	-95	-90	-49	-90	-41	Hsd17b1	-37	-71	-66	-98	-57	-36
Drd2	-73	-67	-55	-80	-21	-57	Drd2	-73	-67	-55	-80	-21	-57	Htr7	-53	-81	-42	92	-9	5	Oxgr1	-79	-47	-84	-93	-97	-89
Drd3	-84	-89	-89	-79	-30	-78	Drd3	-84	-89	-89	-79	-30	-78	Kiss1r	-70	-74	-68	-22	35	-31	Pkhd11	-60	-59	-36	-18	-40	-55
Drd4	-68	-47	-60	-63	-39	-33	Drd4	-68	-47	-60	-63	-39	-33	Lgr4	-23	-18	-30	-82	-71	89	Trhr2	-74	-29	-78	-84	-10	-44
F2r	82	81	88	-13	78	37	F2r	82	81	88	-13	78	37	Lgr5	-43	-68	-40	-69	-40	-63	Gpr137	-55	-52	-58	-20	-58	-50
F2r1	-12	-3	-4	-20	-3	1	F2r1	-12	-3	-4	-20	-3	1	Lgr6	-5	-5	-5	-15	-33	-43	Gpr137b	79	79	93	92	79	80
F2r2	-64	-67	-47	-7	-19	-36	F2r2	-64	-67	-47	-7	-19	-36	Lhcr	-89	-84	-77	-90	-74	-73	Pth1r	35	52	-9	-90	-76	-59
F2r3	-60	-56	-56	-83	-51	-57	F2r3	-60	-56	-56	-83	-51	-57	Lpar1	46	49	8	-27	-42	-60	Pth2r	-67	-65	-83	-94	-65	-79
Ffar2	66	59	59	-1	52	15	Ffar2	66	59	59	-1	52	15	Lpar2	45	64	53	-23	24	12	Calcrl	80	80	64	-26	60	61
Fpr1	65	64	72	17	57	63	Fpr1	65	64	72	17	57	63	Lpar3	25	29	-9	100	-5	7	Cmr1	-48	-34	-19	-2	-45	-25
Fpr3	-78	-75	-12	-74	-7	-17	Fpr3	-78	-75	-12	-74	-7	-17	Lpar4	90	90	48	-19	44	-13	Cmr2	-59	-65	-73	-54	-37	-89
Fshr	-40	43	-21	-3	-57	-12	Fshr	-40	43	-21	-3	-57	-12	Ltb4r1	61	60	72	59	82	86	Celsr1	6	33	40	94	-11	-1
Galr1	-18	-68	-59	-81	29	-75	Galr1	-18	-68	-59	-81	29	-75	Ltb4r2	-32	-57	-48	-36	6	-45	Celsr2	-3	-3	-48	-15	-44	-71
Galr2	-84	-81	-97	-85	-69	-83	Galr2	-84	-81	-97	-85	-69	-83	Mas1	-69	-82	-93	-79	-12	-							

Receptor expression in bipotent progenitors (BP) and AT2 cells relative to cells in GEXC



Gene	BP			AT2			Gene	BP			AT2			Gene	BP			AT2																					
	1	2	3	1	2	3		1	2	3	1	2	3		1	2	3	1	2	3																			
<b>GPCR</b>																																							
Gipr	22	-8	10	-61	65	-51	Ptprv	-68	-74	-64	-63	-6	-34	Gfra3	16	-19	-39	21	6	-34	Fzd3	1	-6	-42	37	-48	-35												
Glip1r	6	-33	-26	-36	-24	-79	Ptpra	-58	-16	-39	-33	17	-16	Gfra4	-76	-85	-92	-70	-83	-60	Fzd4	22	32	-9	-15	-27	-41												
Gpr98	-39	-44	-52	-11	-14	-46	Ptprg	63	59	91	86	82	93	Acvr1	66	65	67	83	-14	22	Fzd5	74	74	79	52	43	66												
Sctr	-73	-78	-62	-54	-51	-16	Ptprh	88	86	36	-45	-34	-36	Acvr1b	11	13	15	27	18	-37	Fzd6	57	54	51	72	-32	-46												
Vipr1	-52	-46	-84	-4	0	-5	Ptprz1	-19	-29	-44	17	-46	-52	Acvr1c	-29	-18	-60	-31	-54	-53	Fzd7	70	68	54	19	-17	13												
Vipr2	-42	-68	-61	-69	-49	-59	Ptprz2	-21	-23	-44	-33	-37	-67	Acvr1d	59	59	5	56	-7	18	Fzd8	66	67	27	16	-47	-70												
Casr	-51	-14	-63	-1	-21	-26	Ptprm	-74	-70	-66	-84	-69	-60	Bmpr1a	31	33	49	17	-34	-40	Fzd9	-83	-87	-73	-77	-41	-72												
Gabbr1	-14	-10	-17	-19	-49	-25	Ptprm2	-29	-68	-13	-20	46	-58	Bmpr1b	-10	5	-72	52	-46	-60	Lrp5	-89	-96	-86	-90	-87	-68												
Gpr158	-66	-73	-64	-49	-51	-78	Axl	48	41	64	17	-46	-22	Tgfb1	71	63	89	76	56	76	Lrp6	-41	-26	-20	-26	-18	-20												
Gpr179	-63	-63	-70	-32	-39	30	Merlk	59	53	68	61	-1	5	Ret	-32	-37	-71	-28	-21	-14																			
Gprc5b	-35	-22	-48	-19	-37	-51	Tyro3	-24	3	-70	38	-58	-59	Acvr2a	-72	-78	-58	-52	-10	-32																			
Gprc5c	-38	-22	-73	53	-51	-41	Egfr	-14	-17	24	-49	-83	-94	Acvr2b	-46	-3	-2	-22	-71	-76																			
Gprc5d	-73	-72	-65	-19	-27	-80	Erb2	-34	-15	-36	-6	-51	-77	Amhr2	0	11	31	-54	-9	-37																			
Gprc5a	-5	-24	-45	-63	-77	-66	Erb3	27	34	14	-4	-40	-39	Bmpr2	56	54	62	23	22	29																			
Grm1	-57	-67	-78	-66	-52	-51	Erb4	-68	-83	-86	-95	-69	-86	Tgfb2	58	54	84	66	42	61																			
Grm2	-38	-38	-70	-83	-57	-66	Epha1	44	20	-11	-24	-7	-43	Eng	58	61	-21	-46	0	-4																			
Grm3	-49	-82	-88	-52	-35	-91	Epha10	-55	-41	-32	-81	-20	-24	Tgfb3	37	34	27	-40	4	21																			
Grm4	-69	-77	-66	-26	-56	-61	Epha2	55	59	65	40	4	-5	Cd27	-52	-79	-77	-71	-3	-7																			
Grm5	-58	-56	-83	-95	-19	-67	Epha3	78	78	72	-99	-30	-85	Cd40	42	30	9	84	83	77																			
Grm7	-78	-61	-78	-71	-25	-62	Epha4	19	30	26	-69	-14	-9	Eda2r	-53	-56	-64	-83	-50	-77																			
Grm8	-77	-73	-90	-78	-31	-45	Epha5	-9	-10	-51	-92	-55	-97	Edar	-46	-67	-44	-33	-34	-18																			
Gprc5a	45	45	74	19	-7	-16	Epha6	-67	-79	-60	-94	-39	-75	Fas	-34	-33	-5	14	-32	-11																			
Gpr143	-46	-61	-74	-88	-51	-47	Epha7	23	39	11	-39	-36	-28	Ltbr	-3	2	11	11	-24	24																			
Gpr108	-23	-34	-4	10	-76	-9	Epha8	-22	-53	-40	-30	38	-29	Ngrf	-60	-67	-83	-56	-94	-44																			
Gpr107	98	99	78	58	49	72	Ephb1	-16	-10	-33	-81	-32	-71	Ngrap1	-18	-19	-22	4	-41	-42																			
Tmem87a	-25	-35	-22	-9	-47	-35	Ephb2	-41	-32	-70	-69	-76	-86	Relt	91	91	69	53	75	80																			
Tmem87b	67	71	77	15	13	37	Ephb3	74	57	44	-19	-35	-68	Tnfrsf10b	-61	-53	-92	-36	-6	-36																			
Gpr155	11	9	11	97	46	21	Ephb4	60	63	-32	-63	-89	-62	Tnfrsf11a	-1	-21	-6	-12	-27	-11																			
Gpr89	-78	-77	-95	-75	-84	-82	Eph6	-42	-29	-71	-31	-49	-25	Tnfrsf11b	-6	-1	-49	-38	-51	-82																			
Tpra1	-8	-4	-36	-67	-74	-11	Fgfr1	-25	-20	-11	57	-29	-17	Tnfrsf12a	0	4	13	-14	-19	9																			
<b>Hedgehog</b>																																							
Npc1	58	62	65	71	-29	71	Fgfr2	73	79	28	28	-17	-14	Tnfrsf13b	18	11	11	33	-2	33																			
Ptch1	86	85	80	4	6	-42	Fgfr3	62	59	32	70	-49	-29	Tnfrsf13c	-83	-95	-57	-17	38	23																			
Ptch2	97	98	66	44	62	70	Fgfr4	66	68	53	36	47	46	Tnfrsf14	-53	-70	-26	-73	-16	-13																			
Smo	23	28	-12	-43	-65	-64	Fgfr1	0	27	14	-30	22	-50	Tnfrsf17	-89	-77	-60	81	48	91																			
<b>Inositol</b>																																							
Itpr1	-1	-4	-19	41	-10	-1	Met	45	51	32	53	6	10	Tnfrsf18	-26	-19	-30	33	32	62																			
Itpr2	37	28	51	64	79	82	Mst1r	-15	-3	-29	-82	-20	-73	Tnfrsf19	20	23	12	-49	-34	-59																			
Itpr3	-17	-1	-19	7	8	35	Alk	-70	-45	-86	-56	-50	-34	Tnfrsf1a	86	80	98	73	100	99																			
C6	-11	-11	-46	-4	-74	-20	Ddr1	76	78	67	78	53	7	Tnfrsf1b	87	84	93	89	93	97																			
C8a	-80	-92	-92	-35	-29	27	Ddr2	2	-2	-8	-67	-51	-42	Tnfrsf21	74	69	-83	65	-5	77																			
C8b	-74	-61	-49	-33	-34	40	Igf1r	82	85	90	64	79	81	Tnfrsf22	-24	-51	-29	-37	-47	-11																			
C8c	-72	-68	-63	-63	-35	-60	Igf2r	79	74	69	84	45	39	Tnfrsf23	-49	-65	-49	-59	-66	-32																			
C9	-72	-68	-63	-63	-35	-60	Insr	49	48	66	18	51	18	Tnfrsf25	-29	-14	-18	-18	35	32																			
Cd320	-30	-91	-12	-37	0	-19	Insr	-58	-19	-77	-87	40	-9	Tnfrsf4	-39	-51	-13	-5	-16	-8																			
D18Erd653e	8	31	49	-10	-22	17	Ltk	-38	-43	-45	34	55	-6	Tnfrsf8	-93	-79	-83	-85	-20	-64																			
Ldlr	69	70	85	52	65	84	Ntrk1	-38	-35	-86	-87	-14	-76	Tnfrsf9	-70	-61	-23	-4	-15	-7																			
Ldlrad3	80	74	18	-45	65	71	Ntrk2	-29	-43	-48	-89	-79	-55	Cd180	-12	-3	-18	-2	26	-9																			
Lrp1	41	48	85	-21	41	-16	Ntrk3	-5	-8	-51	-97	-68	-42	Tlr1	-4	-8	-6	-3	37	38																			
Lrp10	-2	0	46	52	48	47	Ptk7	-19	-31	-59	-50	-53	-67	Tlr2	-48	-55	-76	-12	-14	-59																			
Lrp11	-41	-30	-81	-18	-60	-72	Ros1	-58	-64	-58	-72	-65	-62	Tlr3	36	36	50	13	49	65																			
Lrp12	55	54	81	23	-73	3	Csf1r	82	80	90	76	88	90	Tlr4	74	72	86	53	62	67																			
Lrp1b	-62	-35	-68	-58	31	-21	Fit1	75	78	63	17	32	63	Tlr5	-11	0	36	83	14	34																			
Lrp2	-8	-7	-54	-8	-37	-23	Fit3	-49	-42	-51	92	80	85	Tlr6	33	30	36	1	99	98																			
Lrp3	-85	-90	-95	-91	-59	-86	Fit4	29	41	-2	-65	-23	-50	Tlr7	0	-4	15	-5	30	31																			
Lrp4	63	55	66	58	-44	-8	Kdr	92	91	63	74	-4	15	Tlr8	-43	-59	-19	-69	-41	18																			
Lrp8	10	15	20	-35	25	-15	Kit	53	58	61	71	-19	-10																										



**Supplementary Table 2.** (a) Gene expression profiles of alveolar bipotent progenitors and LysM-lineage alveolar type 2 (AT2) cells. Expression levels of genes encoding receptors. Muc1+/Pdpn+ bipotent progenitor (BP) cells from E18 wild type lungs and Tomato+/EpCAM+ AT2 cells from adult LysM-Cre> tdTomato lungs were FACS purified then RNA was extracted and processed for analysis on Affymetrix DNA microarrays. Chart displays all 698 known and predicted receptor genes (H. Espinoza and M.K. unpublished) organized by receptor family in rows and biological replicates in columns. Each bin shows the percentile (-100 to +100) and heat map-coded level of expression of the corresponding gene in BP or AT2 cells relative to levels observed in >11,000 archived microarray experiments (representing hundreds or thousands of different cell and tissue types) using the identical probe, as determined from Gene Expression Commons<sup>1</sup> (GEXC). (b) Expression levels of EGF receptor family members. Representative GEXC probe set intensity histograms of expression levels for Egfr, Erbb2, Erbb3, and Erbb4, with the average intensity indicated by arrows for BP cells, AT2 cells, and for a control cell type (B cell) believed not to express any EGF receptors<sup>2,3</sup> (NEG, negative). Note that the histogram of expression levels for the Erbb4 probe is low and narrow indicating it does not provide useful Erbb4 expression information. E, embryonic day.

1 Seita, J. et al. Gene Expression Commons: an open platform for absolute gene expression profiling. PLoS One 7, e40321 (2012).

2 Yu, X. et al. Ligand-independent dimer formation of epidermal growth factor receptor (EGFR) is a step separable from ligand-induced EGFR signaling.

Mol Biol Cell 13, 2547-2557 (2002).

3 Moroni, M. et al. Epidermal growth factor receptor expression and activation in nonseminomatous germ cell tumors. Clin Cancer Res 7, 2770-2775 (2001).

a

## Selectively expressed genes

BP				AT2																	
Gene	%	Gene	%	Gene	%	Gene	%	Gene	%	Gene	%	Gene	%	Gene	%	Gene	%	Gene	%	Gene	%
Osm	100	Poldip3	93	Odf3b	100	Ctsb	98	Clec7a	97	Nbas	96	Tekt2	94	Sema4f	93	Pcyt1a	92	Pvr	91		
Pik3cd	99	Ski	93	Dnajb14	100	Cyfp1	98	Taok3	97	Ezr	96	Mobkl2b	94	Ptpn12	93	Gpr33	92	Ly75	91		
Sftpc	99	Jhdm1d	93	Fam183b	100	Chd4	98	Cpeb2	97	Kif13b	96	Socs3	94	Cmtm8	93	Tppp3	92	Ap3d1	91		
Abcg1	99	Tgfb1	93	AU021034	100	Gm1574	98	Sf3b2	97	P14k2a	96	Src3	94	Cbr3	93	Ccdc12	92	Tnfrsf2	91		
Trpm7	99	Lrrfip1	93	Dnahc6	100	Iqgap1	98	Tmem50b	97	Amac1	96	Klrb1b	94	Stk30	93	Slc25a36	92	Il1a	90		
Ets2	99	Myo7a	93	Trpm7	100	Cotl1	98	Btg2	97	Bat5	96	Fam167a	94	Ccdc52	93	Ifi77	92	Ttf1	90		
Ustf2	98	Kctd12b	93	Ddx6	100	Reep3	98	Ccl22	97	Dync2li1	96	Usp19	94	Irf8	93	Hes6	92	Enkur	90		
Cotl1	98	Mospd2	93	Dnahc9	100	Fam149a	98	Ing3	97	Bach1	95	Lrrc23	94	Zze1	93	Col23a1	92	Nudt9	90		
Tcf7l2	98	Cmtm6	93	Ear3	100	Ear3	98	Fosb	97	Ccdc108	95	Scaper	94	Zfp474	93	Rab36	92	Dnajc1	90		
Zdhc14	98	Fras1	93	Cd83	100	Spty2d1	98	Cdhr4	97	Col4a3bp	95	Ctsh	94	Mobkl1b	93	Cd80	92	Cyp39a1	90		
Dag1	98	Dnajb14	93	Cd207	100	Wdr66	98	Fam164a	97	Jun	95	Rap2a	94	Efcab1	93	Ep400	92	Ardc1	90		
Nlr1	97	Sf3b4	93	Ces1d	100	Stim1	98	Laptm5	97	Ttc12	95	Galnt11	94	Uhrf1bp1	93	Fam119a	92	Entpd4	90		
Runx1	97	Cyfp1	93	Etv3	100	Tctex1d4	98	Tiparp	97	Gm1060	95	Actg1	94	Atp13a3	93	Tekt4	92	Slc141a1	90		
Trim25	97	Cd8a	92	Tmem107	100	Zfp800	98	Hspa4l	97	Cd86	95	Igh-VJ558	94	Il13ra1	93	Armc3	92	Irf5	90		
Trem1	97	Cyrb1	92	Lpar3	100	Nav2	98	Igj	97	Cbfa2t3	95	Ifi35	94	Prkar2a	93	Ptpn13	92	Dnajc17	90		
C77027	97	Bnip2	92	Cpne3	100	Parp4	98	Mgl2	97	Aldh1a7	95	Zc3h12c	94	Socs3	93	Atp2b1	92	Rgnf	90		
Ptnn12	97	Star9	92	Spag16	100	Ttli3	98	Unc119b	97	Chchd6	95	BC013712	94	Caps2	93	Chka	92	Fam105a	90		
Ear2	97	Cybas3	92	Akap14	100	Skil	98	Rnf215	97	Mycbp	95	Dusp1	94	Rassf7	93	Atp6v0a2	92	Rbpj	90		
Mapre1	97	Sema3f	92	Eno4	100	Aldh3b1	98	Tmbim1	97	Ptpn11	95	Far1	94	Csrnp1	93	Gtpbb4	92	Cpd	90		
Eepd1	97	Hlip	92	Ftsj2	100	C030046G05	98	Dnaic2	96	Gan	95	Cd209a	94	Agps	93	Trpv2	92	Zfp704	90		
Cx3cr1	97	Fam124b	92	Alcam	100	Ptchd1	98	H2-Ab1	96	Dcxr	95	Gdl2	94	Mical1	93	Ctcl3	92	Odc1	90		
Nfkibz	97	Clec4a3	92	Endog	100	Rsp4a	98	Atf3	96	Klf6	95	Gna13	94	Slc29a3	93	Per1	92	Pdlim5	90		
Gan	97	Fam38a	92	Ubc	100	Ccr10	98	Wdr19	96	Ccdc153	95	Tmem109	94	Rc3h2	93	Cyb5b1	92	Tor1aip1	90		
Gpr107	97	Vamp3	92	Naa	100	Dynlr2	98	Limd1	96	Cd209c	95	Ucp2	94	Ap1s3	93	AW555355	92	Yip6	90		
Irs2	97	Klf6	92	Nr4a2	99	Pkib	98	Rtrd1	96	Naga	95	Ifi81	94	Gm5918	93	Prr5l	92	Dnajb2	90		
Naa	96	Lem2	92	Fam179a	99	Ubl3	98	Alas1	96	Tctd18	95	Cldn3	94	Dab2ip	93	Wdr16	92	Fgl2	90		
Fosl2	96	Il6ra	92	Gga1	99	Arh2	98	Dync2h1	96	Ccdc74a	95	Fosl2	94	Srx6	93	Arf4	92	Rtn4	90		
Spty2d1	96	Cyp4f18	92	C77027	99	Arpc2	98	Hectd1	96	Pnrc1	95	Bcl2l11	94	Tbca	93	Hspa2	92	Ccnd1	90		
Zeb2	96	Mef2a	92	Irs2	99	Irf5	98	Nr4a3	96	Atp7a	95	Porcn	94	Fbxw11	93	Rabge1	91	Trio	90		
Nr4a2	96	Zkscan3	92	Slc16a11	99	Hspb11	98	Ppp1r16a	96	Il6ra	95	Tnfrsf9	94	Ccr2	93	Rpr	91	Hnmp2	90		
Plixdc2	96	Cttnbp2nl	92	Kif6	99	Zeb2	98	Sh3pxd2b	96	Oscp1	95	Cab39	94	Xist	93	Rnf166	91	Orai1	90		
Sf1	96	Cpeb2	92	Fam47e	99	Gl25d1	98	Tnfrsf3	96	Ndel1	95	Efr3a	94	Tmem176a	93	Mli5	91	Skap2	90		
Sh3bp5	96	Kank2	92	Slc35a5	99	Camk1d	98	Tob2	96	H2-Eb1	95	Chuk	94	Tc7	93	Mvp	91	Skap2	90		
Diap2	96	Ptch2	92	Lrk1	99	Grasp	98	Mga	96	Cetn4	95	Mycbp	94	Atp7	93	Pdcd6ip	91	Aldh16a1	90		
Slc35a5	96	Uxs1	92	Wdyhv1	99	Egr2	98	Nab1	96	Leprot	95	Lztf1	94	Kif21a	93	Irfd1	91	Dhd1	90		
Kdm6b	96	Ergic3	92	Abcg1	99	Cd44	98	Kcnmb2	96	Nfe2l2	95	Tctn2	94	Ctnna1	93	Zfp318	91				
Dusp16	96	Eif2ak2	91	Ppt1	99	Wdfy4	98	Lasp1	96	Brd2	95	Btdb7	94	Lonf3	93	Gdpd1	91				
Ctsh	96	Map3k3	91	Kdm6b	99	H47	98	Tpr	96	Fam38a	95	Cardk	94	Trim25	93	Snx6	91				
Ezfs	96	Akap5	91	Cyp2f2	99	Zfp361	98	Rsp3a/b	96	Cdhr3	95	Akap9	94	Klf4	93	Bcap31	91				
Sfxn2	95	Tnfrsf1a	91	Trib1	99	Ttc34	98	D19Erd744e	96	D15Wsu126e	95	Nhp1	94	Rsf1	93	Gm5480	91				
Clec7a	95	Adora2b	91	Cmtm6	99	Ubcx4	98	Crebpp	96	Tcc1d22a	95	Arl13b	94	Rsp10b2	93	Mapk14	91				
Edn3	95	Gl25d1	91	Cdcl14a	99	Btg1	98	Maff	96	Rp2h	95	Ski	94	Foxa2	93	Dusp16	91				
Per1	95	Gadd45gip1	91	Mom1	99	Fbrs1	98	Hfe	96	Rrc51	95	Fign	94	Jdp2	93	Crif2	91				
Maff	95	Dnajb9	91	Fam20b	99	Myo1g	98	Dnahc7a	96	Mbp	95	Gm2a	94	Pgap2	93	D19Erd652e	91				
Rabge1	95	Shh	91	Cetn2	99	Nek5	98	Eif2c3	96	Mospd2	95	Atp7b	94	Bnip2	93	Gpr137b-ps	91				
Usp25	95	Pxdn	91	Ppil6	99	Mthfs	98	Fam154b	96	Twf2	95	Ctss	94	Arl3	93	Irga4	91				
Kif13a	95	Cd44	91	Runx1	99	Igae	98	Picalm	96	Tgfb1	95	Arhgdig	94	Dusp5	93	Rsp11	91				
Cpne3	95	Pqlc1	91	Nfkbia	99	Cib4	97	Elof1	96	Eif1	95	Igh-6	94	Senn1b	93	Erlin1	91				
Gatad2a	95	Rgs2	91	H2-DMA	99	Cyp2s1	97	Hydin	96	Wnk1	95	Apoa1bp	94	Traf3ip1	93	Cxcl2	91				
Arndc1	95	Alcam	91	Spp2	99	Gns	97	AU017263	96	Mapre1	95	Tie1	94	Actb	93	Creb5	91				
Bcl2l11	95	Hif1an	91	Irx5	99	Sfxn2	97	Sh3brg1	96	Trp73	95	Pbrm1	94	Hsp90b1	93	Foxa1	91				
Pde7a	95	Spef1	91	Ttc21a	99	Mapk15	97	Arl6ip1	96	Rela	95	Sl3gal1	94	Pvr	93	Ttc25	91				
Trib1	95	Cytl1	91	Ttc30b	99	Amz1	97	Osgin2	96	Tcf7l2	95	Nfkbid	94	Plek	93	Abca7	91				
Crybb1	95	Fosb	91	H2-Aa	99	Ppm1m	97	Gadd45b	96	Rps28	95	Batf3	94	Gnal2	93	Jak2	91				
Hif3a	95	Lyst	91	Hes1	99	Ifi30	97	Crem	96	Iffo2	95	Ubn1	94	Mfsd6	93	AA408251	91				
Mapkap3	95	Myo1c	91	Ospl6	99	Nfkibz	97	Lca5	96	Zfp445	95	Fam69a	94	Csde1	93	Ubxn11	91				
Slc25a29	95	Ndel1	91	Ak7	99	Map3k5	97	Mfsd6l	96	Ighg	95	Gng10	94	Rab11b	93	Slc23a2	91				
Tiparp	95	Lipo1	91	AB041803	99	Sec24b	97	Pde4b	96	Lrrfip1	95	Egr3	94	Rock1	93	Pip4k2a	91				
Pcsk5	94	Fam129a	91	Dock10	99	Irak1	97	Cdc151	96	Gapvd1	95	Srrm2	94	Cnd2	92	Ammek11	91				
Hexim1	94	Junb	91	Ear2	99	Aftph	97	Foxj1	96	T2	95	Hepacam2	94	Ccdc114	92	Hdc	91				
Frat2	94	Acbd3	91	Gas2l2	99	Lrrc45	97	Fos	96	Ccdc40	95	Akap13	94	Htr7	92	Ifi88	91				
Bach1	94	Hgsnat	91	H2-DMb1/2	99	Lem2	97	Mapkap3	96	Tagln2	95	Rbm39	94	Ang3	92	Smarca2	91				
Egr1	94	Ap3b1	91	Egr1	99	Ddx5	97	Junb	96	Diap2	95	Hspa1b	94	Wdsu1	92	Muc20	91				
Crem	94	P2ry13	91	Ccl17	99	Pcbd2	97	Cldnd1	96	Gt13	95	Kctd12	94	Mak	92	Rassf9	91				
Sertad1	94	Diap1	91	Osm	99	Ifi172	97	Ap3b1	96	Map2k3	95	Ccdc146	94	Uggt1	92	Sfhn1	91				
Atp7a	94	Pum1	91	Syng2	99	Rnaset2a/b	97	Fam129a	96	Sdc1	95	Id2	94	Stc26a2	92	P2rx4	91				
Frm44a	94	Egr2	91	Acbd3	98	Gm101	97	Arl6ip1	96	Wdr78	95	Celsr1	94	Sypl	92	Paq7	91				
Klhdc4	94	Pde4b	91	Capsl	98	Scgb1a1	97	Endod1	96	Dnajb1	95	Dpdc	94	Rnf6	92	Vps52	91				
Amz1	94	Pde4b	91	Ier2	98	Pole3	97	Uvrag	96	Kcnj13	95	Prkx	94	Lsp1	92	Slc12a2	91				
Rbm3s	94	Chst5	90	Tmem123	98	Mef2a	97	Rsp9r	96	Cc2d2a	95	Rgs2	94	Tmed10	92	Tssc4	91				
Zswim6	94	Dgat1	90	Ccdc30	98	Tbc1d4	97	Gm6377	96	Dnahc7b	95	Diap1	94	Zbtb46	92	Nsmf	91				
Socs3	94	Mthfs	90	Zfp36	98	Spag9	97	Tyk2	96	Cytl1	95	Csf2rb	94	Srp14	92	Mf1	91				
Myh9	94	Senp7	90	Tm7sf4	98	Tlr3	97	Antxr2	96	Kif13a	95	Nudt14	94	Il18	92	Plixnc1	91				
Ptprf	94	Picalm	90	Igb1	98	Iqce	97	Cybas3	96	Gm4368	95	Arc	94	Fit3	92	Usp6nl	91				
Mcl1	94	Ccr1	90	Fili	98	Hps1	97	Bhlhe40	96	Ik	95	Ehfc1	94	Dusp18	92	Fhdc1	91				
Ier2	94	Irak4	90	Spef1	98	Mcl1	97	Cytlp	96	Nr4a1	95	Arsb	93	Gpr137b	92	Slc22a15	91				
Nab1	94	Ap1s2	90	Gas8	98	Emp1	97	Gsto1	96	Cep164	95	Usp7	93	Cdh1	92	Fars2	91				
Zfp36	94	Cd33	90	Xcr1	98	Tmem212	97	Arhgap5	96	Mettl7a1	95	Pum1	93	AU040972	92	Nlrct1	91				
Adamtsl2	94	Nai2	90	Ccdc162	98	Nme5	97	Hspa1a	96	Spag6	95	Gpr120	93	Irga4	92	Fncd7	91				

b

## Classes of genes most selectively expressed

BP			AT2		
Gene annotation	Fold enrichment	p-value	Gene annotation	Fold enrichment	p-value
IPR011616:bZIP transcription factor, bZIP-1	25	1.1E-04	IPR000837:Fos transforming protein	24	1.4E-03
IPR004827:Basic-leucine zipper (bZIP) transcription factor	16	2.5E-04	cilium biogenesis/degradation	16	9.2E-07
SM00338:BRLZ	12	5.0E-04	GO:0035085-cilium axoneme	11	1.2E-03
domain:Leucine-zipper	9.2	8.3E-04	IPR011616:bZIP transcription factor, bZIP-1	11	2.0E-04
DNA-binding region:Basic motif	6.4	1.6E-02	GO:0005930-axoneme	11	2.6E-06
GO:0003700-transcription factor activity	2.7	1.7E-02	IPR004827:Basic-leucine zipper (bZIP) transcription factor	7.7	7.5E-05
phosphoprotein	1.4	1.3E-02	cilium	7.2	1.3E-06
			mmu04672:Intestinal immune network for IgA production	6.9	1.1E-04
			SM00338:BRLZ	6.3	1.2E-04
			GO:0005929-cilium	5.6	3.8E-08

**Supplementary Table 3.** (a) Genes highly selectively expressed by bipotent progenitor (BP) and AT2 cells. Genes expressed in BP cells (average of three replicates) and AT2 cells (replicate 1) at the 90th percentile or higher (calculated by GEXC), totaling 174 genes for BP and 644 genes for AT2, 93 of which (bold type) are shared by these cell types. Genes that encode transcription factors (yellow), receptors (blue), and nuclear receptors (green) are highlighted. (b) DAVID<sup>1</sup> gene annotation enrichment analysis (<http://david.abcc.ncifcrf.gov/>) of the genes, identifying classes that are significantly overrepresented ( $p < 0.015$  with Bonferroni correction) among genes selectively expressed by BP cells and AT2 cells. The BP selective genes are enriched for bZIP transcription factors and phosphoproteins, whereas the AT2 selective genes are enriched for Fos and other bZIP genes, and cilium biogenesis genes.

1 Huang, D.W. et al. Systematic and integrative analysis of large gene lists using DAVID Bioinformatics Resources. Nat Protoc 4(1), 44 -57 (2009).