

Supplementary Table S1. RNA expression profiles comparing MRI-negative (MRI-) and MRI-positive (MRI+) tumor regions (Pt1–Pt3).

Columns list per-patient TPMs, per-patient log₂ fold-change (log₂FC; $\epsilon = 0.011$), $\Delta\log_{10}(\text{mean}) = \log_{10}(\text{mean}[\text{MRI-}] + \epsilon) - \log_{10}(\text{mean}[\text{MRI+}] + \epsilon)$, and direction consistency (based on per-patient log₂FC: 3/3 up, 2/3 up, mixed (including cases with zero log₂FC in one or more patients), 2/3 up in MRI+, 3/3 up in MRI+). Rows are ordered with IL5RA first, followed by direction consistency (3/3 up → 2/3 up → mixed → 2/3 up in MRI+ → 3/3 up in MRI+) and, within each group, by descending $|\Delta\log_{10}(\text{mean})|$. Differential-expression thresholds ($|\log_2\text{FC}| > 1$ and FDR < 0.05) were applied solely during the initial RNA-seq candidate-selection step and were not used for direction-consistency grouping, which was defined based only on the sign of each per-patient log₂FC. ϵ was added to avoid log of zero. IL5RA was prioritized for validation because of its consistent MRI- upregulation and antibody availability. The complete dataset is also provided as Source Data (Supplementary_Table_S1_full.xlsx).

Symbol	Pt1_MRIpos	Pt1_MRIneg	log2FC_Pt1	Pt2_MRIpos	Pt2_MRIneg	log2FC_Pt2	Pt3_MRIpos	Pt3_MRIneg	log2FC_Pt3	Delta_log10_mean	Direction_consistency
IL5RA	0.0	27.3	11.28	5.1	11.1	1.13	0.0	32.2	11.51	1.14	3/3 up in MRI-
PABPC1L2B	0.0	89.5	12.99	0.0	19.0	10.76	0.0	28.2	11.33	3.62	3/3 up in MRI-
LANCL3	0.0	60.5	12.42	0.0	31.7	11.50	0.0	28.2	11.33	3.56	3/3 up in MRI-
AC109809.1	0.0	14.9	10.41	0.0	25.4	11.17	0.0	58.1	12.37	3.47	3/3 up in MRI-
MIR3671	0.0	34.8	11.63	0.0	25.4	11.17	0.0	31.4	11.48	3.44	3/3 up in MRI-
KLK12	0.0	23.2	11.04	24.0	787.3	5.04	0.0	33.0	11.55	1.55	3/3 up in MRI-
AC105383.1	0.0	32.3	11.52	2.9	23.0	2.98	0.0	46.3	12.04	1.54	3/3 up in MRI-
CYP4F8	0.0	541.7	15.59	49.4	542.0	3.46	0.0	70.6	12.65	1.37	3/3 up in MRI-
HOXA1	0.0	19.1	10.76	5.1	38.1	2.90	0.0	35.3	11.65	1.26	3/3 up in MRI-
C19orf71	0.0	6.6	9.24	4.4	58.7	3.75	0.0	13.3	10.25	1.25	3/3 up in MRI-
SMCO3	14.5	24.0	0.73	13.8	28.6	1.05	0.0	441.7	15.29	1.24	3/3 up in MRI-
DNAH6	0.0	93.6	13.05	8.0	15.9	0.99	0.0	29.0	11.37	1.24	3/3 up in MRI-
AC005005.3	0.0	45.6	12.02	8.0	51.6	2.69	0.0	25.1	11.16	1.18	3/3 up in MRI-
AL022341.2	0.0	53.0	12.23	10.9	44.4	2.03	0.0	35.3	11.65	1.08	3/3 up in MRI-
SPINK13	0.0	94.4	13.07	16.7	78.6	2.23	0.0	18.8	10.74	1.06	3/3 up in MRI-
AC092070.2	0.0	45.6	12.02	10.9	19.8	0.86	0.0	55.7	12.31	1.04	3/3 up in MRI-
CA13	0.0	62.1	12.46	26.9	109.5	2.03	0.0	62.8	12.48	0.94	3/3 up in MRI-
GPR65	0.0	143.3	13.67	24.7	54.0	1.13	0.0	18.0	10.68	0.94	3/3 up in MRI-
ZNF788P	0.0	14.9	10.41	11.6	28.6	1.30	0.0	51.0	12.18	0.91	3/3 up in MRI-
MUC13	0.0	111.0	13.30	30.5	43.6	0.52	0.0	50.2	12.16	0.83	3/3 up in MRI-

HDHD5-AS1	0.0	37.3	11.73	16.0	31.7	0.99	0.0	26.7	11.24	0.78	3/3 up in MRI –
PTCHD3P1	0.0	167.3	13.89	41.4	42.1	0.02	0.0	32.2	11.51	0.77	3/3 up in MRI –
PBX4	0.0	50.5	12.17	26.9	27.8	0.05	0.0	74.5	12.73	0.75	3/3 up in MRI –
EDARADD	0.0	163.2	13.86	69.0	189.7	1.46	0.0	22.8	11.02	0.74	3/3 up in MRI –
AC100861.1	27.3	43.9	0.68	8.7	68.3	2.97	0.0	80.0	12.83	0.73	3/3 up in MRI –
C9orf129	0.0	162.3	13.85	97.4	149.2	0.62	0.0	164.0	13.86	0.69	3/3 up in MRI –
MOGAT2	0.0	112.6	13.32	37.8	45.2	0.26	0.0	24.3	11.11	0.68	3/3 up in MRI –
LINC02560	13.7	30.6	1.17	14.5	61.9	2.09	0.0	42.4	11.91	0.68	3/3 up in MRI –
AC012291.2	0.0	24.0	11.09	19.6	41.3	1.07	0.0	25.1	11.16	0.66	3/3 up in MRI –
MASTL	0.0	115.1	13.35	60.3	107.9	0.84	0.0	51.0	12.18	0.66	3/3 up in MRI –
ISX	0.0	57.2	12.34	26.2	39.7	0.60	0.0	18.8	10.74	0.65	3/3 up in MRI –
HEXIM2	46.6	188.0	2.01	56.7	141.3	1.32	0.0	113.0	13.33	0.63	3/3 up in MRI –
U73166.1	0.0	96.1	13.09	55.9	91.3	0.71	0.0	14.1	10.33	0.56	3/3 up in MRI –
EXOC3-AS1	47.4	96.9	1.03	24.0	38.1	0.67	0.0	107.5	13.25	0.53	3/3 up in MRI –
AC138150.2	47.4	132.5	1.48	60.3	110.3	0.87	0.0	76.9	12.77	0.47	3/3 up in MRI –
C2CD4B	0.0	31.5	11.48	47.2	66.7	0.50	0.0	25.9	11.20	0.42	3/3 up in MRI –
ZNF350-AS1	8.8	133.4	3.91	533.3	1208.7	1.18	0.0	25.9	11.20	0.40	3/3 up in MRI –
LINC01588	83.5	119.3	0.51	0.0	60.3	12.42	0.0	30.6	11.44	0.40	3/3 up in MRI –
CST2	0.0	43.9	11.96	109.0	143.6	0.40	0.0	70.6	12.65	0.37	3/3 up in MRI –
CAPN10-DT	146.2	323.9	1.15	90.8	178.6	0.98	132.0	328.0	1.31	0.35	3/3 up in MRI –
STK39	1265.2	1466.1	0.21	741.8	1256.3	0.76	582.5	1819.5	1.64	0.24	3/3 up in MRI –
PIK3R3	334.2	519.3	0.64	195.4	301.6	0.63	253.5	505.3	0.99	0.23	3/3 up in MRI –
PPARG	0.0	39.8	11.82	27.6	29.4	0.09	55.6	62.8	0.17	0.20	3/3 up in MRI –
SCML2P1	53.0	144.9	1.45	8.7	0.0	-9.63	0.0	686.5	15.93	1.13	2/3 up in MRI –
COL9A1	56.2	32.3	-0.80	89.4	157.9	0.82	0.0	757.1	16.07	0.81	2/3 up in MRI –
FAR2P3	412.9	0.8	-8.94	28.3	34.9	0.30	0.0	34.5	11.62	-0.80	2/3 up in MRI –
RTN4R	0.0	15.7	10.48	22.5	17.5	-0.37	0.0	72.2	12.68	0.67	2/3 up in MRI –
NAGS	0.0	47.2	12.07	24.0	7.9	-1.59	0.0	45.5	12.01	0.62	2/3 up in MRI –

RPL7P16	87.6	48.0	-0.87	169.3	527.8	1.64	0.0	464.5	15.37	0.61	2/3 up in MRI –
AC073869.5	763.1	110.2	-2.79	14.5	35.7	1.30	0.0	47.1	12.06	-0.61	2/3 up in MRI –
SIRT4	0.0	12.4	10.14	18.2	5.6	-1.71	0.0	51.8	12.20	0.58	2/3 up in MRI –
AC100826.1	392.8	37.3	-3.40	16.7	41.3	1.30	0.0	29.0	11.37	-0.58	2/3 up in MRI –
PCGEM1	1351.1	77.9	-4.12	33.4	92.9	1.47	0.0	218.1	14.28	-0.55	2/3 up in MRI –
AF129408.1	15.3	65.4	2.10	35.6	23.8	-0.58	0.0	90.2	13.00	0.55	2/3 up in MRI –
AC108062.1	0.0	59.6	12.40	55.2	47.6	-0.21	0.0	72.2	12.68	0.51	2/3 up in MRI –
AC079322.1	0.0	43.1	11.94	42.9	27.0	-0.67	0.0	65.9	12.55	0.50	2/3 up in MRI –
NRIP2	0.0	72.1	12.68	115.5	100.0	-0.21	0.0	193.0	14.10	0.50	2/3 up in MRI –
GPRC5D-AS1	0.0	100.2	13.15	85.7	52.4	-0.71	0.0	97.3	13.11	0.46	2/3 up in MRI –
AC011611.3	0.0	58.8	12.38	47.2	42.1	-0.17	0.0	33.7	11.58	0.45	2/3 up in MRI –
RNU6-1268P	71.5	0.0	-12.67	0.0	43.6	11.95	0.0	134.2	13.57	0.40	2/3 up in MRI –
AC005064.1	171.1	0.0	-13.93	0.0	39.7	11.82	0.0	34.5	11.62	-0.36	2/3 up in MRI –
CDHR3	0.0	65.4	12.54	48.7	0.0	-12.11	0.0	37.7	11.74	0.33	2/3 up in MRI –
AP002360.3	49.8	78.7	0.66	56.7	17.5	-1.70	0.0	119.3	13.40	0.31	2/3 up in MRI –
RBM26-AS1	34.5	75.4	1.13	69.0	27.0	-1.35	0.0	105.1	13.22	0.30	2/3 up in MRI –
LRRC25	0.0	24.0	11.09	25.4	30.2	0.25	82.9	0.0	-12.88	-0.30	2/3 up in MRI –
Z94160.2	45.8	0.0	-12.02	0.0	7.1	9.34	0.0	16.5	10.55	-0.29	2/3 up in MRI –
FKBP1B	24.9	55.5	1.16	118.4	80.2	-0.56	1.9	129.5	6.09	0.26	2/3 up in MRI –
AP001972.2	0.0	40.6	11.85	56.7	42.9	-0.40	0.0	18.8	10.74	0.26	2/3 up in MRI –
HYAL3	59.4	34.0	-0.81	5.8	77.8	3.74	0.0	3.9	8.48	0.25	2/3 up in MRI –
DGCR9	0.0	36.4	11.69	55.9	34.1	-0.71	0.0	25.1	11.16	0.23	2/3 up in MRI –
SUSD5	0.0	93.6	13.05	93.0	120.6	0.38	70.7	61.2	-0.21	0.23	2/3 up in MRI –
AL353743.4	28.9	0.0	-11.36	0.0	15.9	10.50	0.0	32.2	11.51	0.22	2/3 up in MRI –
CSRNP3	20.9	103.5	2.31	100.3	60.3	-0.73	0.0	29.8	11.40	0.20	2/3 up in MRI –
C1orf210	166.3	151.6	-0.13	71.9	76.2	0.08	0.0	153.0	13.76	0.20	2/3 up in MRI –
NMB	0.0	74.5	12.73	88.6	26.2	-1.76	0.0	19.6	10.80	0.13	2/3 up in MRI –
AC090236.1	136.6	21.5	-2.66	10.9	28.6	1.39	0.0	58.8	12.39	-0.13	2/3 up in MRI –

PRORS1P	0.0	48.9	12.12	16.7	67.5	2.01	245.1	88.7	-1.47	-0.11	2/3 up in MRI-
ZFP92	0.0	58.8	12.38	123.5	66.7	-0.89	0.0	31.4	11.48	0.10	2/3 up in MRI-
LINC00982	0.0	43.9	11.96	11.6	29.4	1.34	185.7	156.1	-0.25	0.07	2/3 up in MRI-
C1orf229	0.0	72.9	12.69	20.3	33.3	0.71	74.5	0.0	-12.72	0.05	2/3 up in MRI-
AC006942.1	0.0	69.6	12.63	21.8	25.4	0.22	133.8	45.5	-1.56	-0.04	2/3 up in MRI-
AL021807.1	80.3	38.1	-1.08	8.7	29.4	1.75	0.0	28.2	11.33	0.03	2/3 up in MRI-
XIRP2	0.0	0.0	0.00	0.0	0.0	0.00	2103.8	0.0	-17.55	-4.80	Mixed/discordant
MYL2	0.0	0.0	0.00	7.3	0.0	-9.37	15282.6	0.0	-20.41	-5.67	2/3 up in MRI+
AC020637.1	0.0	0.0	0.00	0.7	0.0	-6.07	427.0	0.0	-15.24	-4.11	2/3 up in MRI+
AL135910.1	32.1	0.0	-11.51	38.5	39.7	0.04	58.4	0.0	-12.38	-0.51	2/3 up in MRI+
ADAMTS7	78.7	33.1	-1.25	106.8	20.6	-2.37	0.0	51.8	12.20	-0.24	2/3 up in MRI+
AC022075.1	161.5	39.8	-2.02	14.5	10.3	-0.49	0.0	217.3	14.27	0.18	2/3 up in MRI+
KDM4A-AS1	139.8	69.6	-1.01	78.5	69.0	-0.18	0.0	74.5	12.73	-0.01	2/3 up in MRI+
GAPDHP63	24.1	0.8	-4.84	4.4	0.0	-8.63	55.6	7.8	-2.82	-0.98	3/3 up in MRI+
TBX5-AS1	25.7	0.0	-11.19	55.9	16.7	-1.75	66.9	0.0	-12.57	-0.95	3/3 up in MRI+
GRM6	54.6	22.4	-1.29	18.9	0.8	-4.55	85.8	0.0	-12.93	-0.84	3/3 up in MRI+
TERT	312.5	128.4	-1.28	56.7	54.0	-0.07	2161.3	426.0	-2.34	-0.62	3/3 up in MRI+
KIT	724.6	709.8	-0.03	476.6	316.7	-0.59	7251.1	1318.9	-2.46	-0.56	3/3 up in MRI+
PTCH1	2009.0	1220.1	-0.72	1046.9	831.7	-0.33	8214.4	2579.7	-1.67	-0.39	3/3 up in MRI+
IKZF1	140.6	38.1	-1.88	284.1	164.3	-0.79	368.5	128.7	-1.52	-0.38	3/3 up in MRI+
C12orf60	725.4	516.0	-0.49	4655.7	1932.4	-1.27	1676.8	644.1	-1.38	-0.36	3/3 up in MRI+
C3	334.2	250.1	-0.42	2019.1	1977.7	-0.03	2962.5	1143.9	-1.37	-0.20	3/3 up in MRI+