Table SI. Primers in reverse transcription-quantitative PCR.

Gene		Primer (5' to 3')
IL10	F	TCTCCGAGATGCCTTCAGCAGA
	R	TCAGACAAGGCTTGGCAACCCA
CD66b (CEACAM8)	F	TGCTCAGCTCACTATTGAAGC
	R	CCTATAATTCGACGGTTGGCAT
CXCL8	F	CAGCCTTCCTGATTTCTGC
	R	GGGTGGAAAGGTTTGGAGTA
CD33	F	GGCCACTCCAAAAACCTGAC
	R	GACAACCAGGAGAAGATCGGG
BDCA-4 (NRP1)	F	GGCGCTTTTCGCAACGATAAA
	R	TCGCATTTTTCACTTGGGTGAT
STAT1	F	ATGGCAGTCTGGCGGCTGAATT
	R	CCAAACCAGGCTGGCACAATTG
BCL6	F	GGAGTCGAGACATCTTGACTGA
	R	ATGAGGACCGTTTTATGGGCT
TGFβ (TGFB1)	F	TACCTGAACCCGTGTTGCTCTC
	R	GTTGCTGAGGTATCGCCAGGAA
PD-1 (PDCD1)	F	CCAGGATGGTTCTTAGACTCCC
	R	TTTAGCACGAAGCTCTCCGAT
GZMB	F	CCCTGGGAAAACACTCACACA
	R	GCACAACTCAATGGTACTGTCG

F, forward; R, reverse; IL10, interleukin-10; CD66b (CEACAM8), Cluster of Differentiation 66b (Carcinoembryonic Antigen-Related Cell Adhesion Molecule 8); CXCL8, C-X-C Motif Chemokine Ligand 8; CD33, Cluster of Differentiation 33; BDCA-4 (NRP1), Blood Dendritic Cell Antigen 4 (Neuropilin-1); STAT1, Signal Transducer and Activator of Transcription 1; BCL6, B-Cell Lymphoma 6; TGFβ (TGFB1), Transforming Growth Factor β(Transforming Growth Factor Beta 1); PD-1 (PDCD1), Programmed Cell Death Protein 1; GZMB, Granzyme B.

Table SII. Altered genes by CMTM4 knockdown.

Gene name	Gene stable ID	Regulation
SLC1A5	ENSG00000105281	Down
SLC9A6	ENSG00000198689	Up
RRBP1	ENSG00000125844	Up
CYP1A1	ENSG00000140465	Up
CEMIP	ENSG00000103888	Down
PHGDH	ENSG00000092621	Down
ZBTB7C	ENSG00000184828	Down
SLC2A3	ENSG00000059804	Up
TSPYL4	ENSG00000187189	Up
DHRS2	ENSG00000100867	Down
IARS1	ENSG00000196305	Down
CARS1	ENSG00000110619	Down
SLC9A2	ENSG00000115616	Down
METTL7A	ENSG00000185432	Up
GABARAPL1	ENSG00000139112	Up
ID3	ENSG00000117318	Up
SIPA1L2	ENSG00000116991	Down
HSPD1	ENSG00000144381	Down
CACNA1G	ENSG00000006283	Up
SGK1	ENSG00000118515	Down
WARS1	ENSG00000140105	Down
RBM15B	ENSG00000259956	Up
MIAT	ENSG00000225783	Up
PTPRK	ENSG00000152894	Down
RNF213	ENSG00000173821	Up
PHLDA1	ENSG00000139289	Down
MCM3	ENSG00000112118	Down
BCAT1	ENSG00000060982	Down
F2R	ENSG00000181104	Up
PYM1	ENSG00000170473	Down
CLIC5	ENSG00000112782	Down
CTNNAL1	ENSG00000119326	Down
S100A14	ENSG00000189334	Up
CXCL8	ENSG00000169429	Up
NEDD9	ENSG00000111859	Down
LINC00685	ENSG00000226179	Up
GPT2	ENSG00000166123	Down
MTHFD1L	ENSG00000120254	Down
KRT1	ENSG00000167768	Up
MAL2	ENSG00000147676	Down
CSRP1	ENSG00000159176	Up
RIMBP2	ENSG00000060709	Up
UGT1A6	ENSG00000167165	Up
ANXA1	ENSG00000135046	Down
CEBPG	ENSG00000153879	Down
DUSP6	ENSG00000139318	Down
DKK1	ENSG00000107984	Up
YARS1	ENSG00000134684	Down
KRR1	ENSG00000111615	Down
LRIG1	ENSG00000144749	Down
SNX18	ENSG00000178996	Down
GJA1	ENSG00000152661	Down

MAP6D1	ENSG00000180834	Up
TXNIP	ENSG00000265972	Up
EPB41L3	ENSG00000082397	Down
EIF2S2	ENSG00000125977	Down
TP63	ENSG00000073282	Down
ARL4C	ENSG00000188042	Down
LINC02615	ENSG00000251432	Up
SLC7A11	ENSG00000151012	Down
NAA15	ENSG00000164134	Up
GDA	ENSG00000119125	Up
RBM3	ENSG00000102317	Down
ATF4	ENSG00000128272	Down
KRT4	ENSG00000170477	Up
KITLG	ENSG00000049130	Down
CTBP2	ENSG00000175029	Down
NR4A1	ENSG00000123358	Down
EPPK1	ENSG00000261150	Up
TCEA1	ENSG00000187735	Down
S100A11	ENSG00000163191	Down
SORBS2	ENSG00000154556	Down
GANAB	ENSG00000089597	Up
RSL24D1	ENSG00000137876	Down
PSAT1	ENSG00000135069	Down
SLC7A1	ENSG00000139514	Down
CALCOCO1	ENSG00000012822	Up
COL1A1	ENSG00000108821	Up
SLC1A4	ENSG00000115902	Down
LAMB2	ENSG00000172037	Up
ULK1	ENSG00000177169	Up
MRPL3	ENSG00000114686	Down
THAP12	ENSG00000137492	Down
NARS1	ENSG00000134440	Down
ALG5	ENSG00000120697	Up
KRT17	ENSG00000128422	Up
VWA2	ENSG00000165816	Down
TARS1	ENSG00000113407	Down
HSPA9	ENSG00000113013	Down
SLC7A5	ENSG00000103257	Down
ANK1	ENSG00000029534	Up
THEM4	ENSG00000159445	Down
MFAP5	ENSG00000197614	Up
CXCL3	ENSG00000163734	Down
PCK2	ENSG00000100889	Down
PMAIP1	ENSG00000141682	Down
MTHFD2	ENSG00000065911	Down
MARS1	ENSG00000166986	Down
SGSH	ENSG00000181523	Up
TLNRD1	ENSG00000140406	Down
GARS1	ENSG00000106105	Down
AARS1	ENSG00000090861	Down
PLK2	ENSG00000145632	Down
ARL15	ENSG00000185305	Down

Table SIII. Significantly changed KEGG pathways altered by CMTM4 knockdown.

KEGG A class	KEGG B class	Pathway	Out (60)	All (8372)	P-value	Pathway ID
Genetic Information Processing	Translation	Aminoacyl-tRNA biosynthesis	9	46	$2.40x10^{-11}$	ko00970
Metabolism	Global and overview maps	Biosynthesis of amino acids	4	77	$2.18x10^{-03}$	ko01230
Organismal Systems	Aging	Longevity regulating pathway	4	89	$3.70x10^{-03}$	ko04212
Environmental Information Processing	Signal transduction	PI3K-Akt signaling pathway	9	443	$3.99x10^{-03}$	ko04151
Metabolism	Amino acid metabolism	Cysteine and methionine metabolism	3	53	$6.36x10^{-03}$	ko00270
Metabolism	Global and overview maps	2-Oxocarboxylic acid metabolism	2	19	$7.99x10^{-03}$	ko01210
Human Diseases	Infectious disease: bacterial	Legionellosis	3	58	$8.17x10^{-03}$	ko05134
Metabolism	Metabolism of cofactors and vitamins	One carbon pool by folate	2	21	$9.72x10^{-03}$	ko00670
Organismal Systems	Endocrine system	Cortisol synthesis and secretion	3	66	$1.16x10^{-02}$	ko04927
Cellular Processes	Transport and catabolism	Mitophagy	3	73	$1.53x10^{-02}$	ko04137
Environmental Information Processing	Signal transduction	FoxO signaling pathway	4	138	$1.69x10^{-02}$	ko04068
Human Diseases	Cardiovascular disease	Lipid and atherosclerosis	5	221	$2.06x10^{-02}$	ko05417
Metabolism	Amino acid metabolism	Valine, leucine and isoleucine biosynthesis	1	4	$2.84x10^{-02}$	ko00290
Organismal Systems	Endocrine system	Aldosterone synthesis and secretion	3	100	$3.47x10^{-02}$	ko04925
Metabolism	Amino acid metabolism	Glycine, serine and threonine metabolism	2	42	$3.62x10^{-02}$	ko00260
Human Diseases	Infectious disease: parasitic	Amoebiasis	4	177	$3.77x10^{-02}$	ko05146
Metabolism	Metabolism of cofactors and vitamins	Vitamin B6 metabolism	1	6	$4.22x10^{-02}$	ko00750
Cellular Processes	Cell growth and death	Apoptosis	2	48	$4.62x10^{-02}$	ko04214
Organismal Systems	Immune system	NOD-like receptor signaling pathway	4	190	$4.68x10^{-02}$	ko04621

Table SIV. Correlation of CMTM4 and immune gene markers.

		COAD				READ			
		None		Purity		None		Purity	
Description	Gene markers	Cor	P	Cor	P	Cor	P	Cor	P
B cell	CD19	0.002	9.71×10^{-01}	0.072	1.50×10^{-01}	-0.037	6.39×10^{-01}	-0.071	4.04×10^{-01}
	CD79A	-0.013	7.81×10^{-01}	0.056	2.58×10^{-01}	-0.017	8.23×10^{-01}	0.013	8.81×10^{-01}
Monocyte	CD86	-0.122	9.08×10^{-03}	-0.104	3.66×10^{-02}	-0.078	3.20×10^{-01}	0.015	8.59×10^{-01}
	CD115 (CSF1R)	-0.125	7.22×10^{-03}	-0.118	1.76×10^{-02}	-0.149	5.61×10^{-02}	-0.146	8.53×10^{-02}
TAM	CCL2	-0.077	9.88×10^{-02}	-0.057	2.52×10^{-01}	-0.079	3.09×10^{-01}	0.019	8.26×10^{-01}
	CD68	-0.200	1.68×10^{-05}	-0.191	1.04×10^{-04}	-0.148	5.65×10^{-02}	-0.149	7.95×10^{-02}
	IL10	-0.092	5.02×10^{-02}	-0.084	8.99×10^{-02}	-0.229	2.97×10^{-03}	-0.210	1.30×10^{-02}
M1 Macrophage	INOS (NOS2)	0.003	9.57×10^{-01}	0.02	6.86×10^{-01}	0.117	1.33×10^{-01}	0.104	2.25×10^{-01}
	IRF5	-0.129	5.70×10^{-03}	-0.098	4.89×10^{-02}	-0.14	7.19×10^{-02}	-0.103	2.29×10^{-01}
	COX2 (PTGS2)	0.004	9.32×10^{-01}	0.009	8.54×10^{-01}	0.06	4.42×10^{-01}	0.054	5.28×10^{-01}
M2 Macrophage	CD163	-0.100	3.23×10^{-02}	-0.085	8.71×10^{-02}	-0.041	5.97×10^{-01}	0.021	8.06×10^{-01}
	VSIG4	-0.188	5.13×10^{-05}	-0.179	2.84×10^{-04}	-0.268	5.02×10^{-04}	-0.244	3.81×10^{-03}
	MS4A4A	-0.161	5.64×10^{-04}	-0.144	3.59×10^{-03}	-0.176	2.38×10^{-02}	-0.122	1.54×10^{-01}
neutrophils	CD66b (CEACAM8)	0.016	7.39×10^{-01}	-0.027	5.88×10^{-01}	-0.134	8.62×10^{-02}	-0.257	2.27×10^{-03}
	CXCL2	-0.028	5.49×10^{-01}	-0.004	9.40×10^{-02}	-0.122	1.18×10^{-01}	-0.053	5.36×10^{-01}
	CXCL8	-0.098	3.63×10^{-02}	-0.09	6.97×10^{-02}	-0.159	4.10×10^{-02}	-0.117	1.71×10^{-01}
	CD11b (ITGAM)	-0.115	1.39×10^{-01}	-0.152	2.19×10^{-03}	-0.115	1.39×10^{-01}	-0.088	3.04×10^{-01}
	CCR7	-0.06	4.44×10^{-01}	-0.07	4.11×10^{-01}	-0.06	4.44×10^{-01}	-0.07	4.11×10^{-01}
	OLR1 (LOX1)	-0.033	6.74×10^{-01}	-0.07	1.61×10^{-01}	-0.033	6.74×10^{-01}	0.103	2.30×10^{-01}
	CD33	-0.136	3.46×10^{-03}	-0.132	7.55×10^{-03}	-0.186	1.66×10^{-02}	-0.18	3.41×10^{-02}
Natural killer cell	KIR2DL1	-0.141	2.55×10^{-03}	-0.141	4.30×10^{-03}	-0.021	7.87×10^{-01}	-0.017	8.39×10^{-01}
	KIR2DL3	-0.099	3.43×10^{-02}	-0.094	5.75×10^{-02}	-0.047	5.44×10^{-01}	-0.064	4.53×10^{-01}
	KIR2DL4	-0.074	1.16×10^{-01}	-0.067	1.77×10^{-01}	-0.098	2.11×10^{-01}	-0.114	1.81×10^{-01}

	KIR3DL1	-0.088	$5.91x10^{-02}$	-0.092	$6.38x10^{-02}$	-0.085	$2.76x10^{-01}$	-0.066	$4.41x10^{-01}$
	KIR3DL2	-0.069	$1.40x10^{-01}$	-0.061	$2.22x10^{-01}$	-0.107	$1.71x10^{-01}$	-0.122	$1.52x10^{-01}$
	KIR3DL3	-0.023	$6.16x10^{-01}$	-0.022	$6.61x10^{-01}$	-0.096	$2.16x10^{-01}$	-0.063	$4.58x10^{-01}$
	KIR2DS4	-0.036	$4.38x10^{-01}$	-0.029	$5.59x10^{-01}$	-0.031	$6.96x10^{-01}$	0.027	$7.48x10^{-01}$
Dendritic cell	HLA-DPB1	-0.264	$9.76x10^{-09}$	-0.268	$3.99x10^{-08}$	-0.265	$5.72x10^{-04}$	-0.270	$1.28x10^{-03}$
	HLA-DQB1	-0.155	$8.46x10^{-04}$	-0.166	$7.83x10^{-04}$	-0.182	$1.88x10^{-01}$	-0.203	$1.68x10^{-02}$
	HLA-DRA	-0.203	$1.18x10^{-05}$	-0.191	$1.10x10^{-04}$	-0.218	$4.87x10^{-03}$	-0.200	$1.83x10^{-02}$
	HLA-DPA1	-0.184	$7.73x10^{-05}$	-0.163	$9.59x10^{-04}$	-0.203	$8.81x10^{-03}$	-0.181	$3.32x10^{-02}$
	BDCA-1 (CD1C)	-0.023	$6.28x10^{-01}$	-0.001	$9.79x10^{-01}$	-0.125	$1.09x10^{-01}$	-0.128	$1.33x10^{-01}$
	BDCA-4 (NRP1)	0.015	$7.54x10^{-01}$	0.032	$5.19x10^{-01}$	0.169	$2.95x10^{-02}$	0.271	$1.24x10^{-03}$
	CD11c (ITGAX)	-0.117	$1.24x10^{-02}$	-0.115	$2.07x10^{-02}$	-0.108	$1.66x10^{-01}$	-0.060	$4.84x10^{-01}$
CD8+T cell	CD8A	-0.101	$3.08x10^{-02}$	-0.076	$1.24x10^{-01}$	-0.099	$2.04x10^{-01}$	-0.087	$3.07x10^{-01}$
	CD8B	-0.103	$2.82x10^{-02}$	-0.083	$9.52x10^{-02}$	-0.138	$7.63x10^{-2}$	-0.067	$4.32x10^{-01}$
T cell(general)	CD3D	-0.15	$1.32x10^{-03}$	-0.138	$5.21x10^{-03}$	-0.183	$1.86x10^{-2}$	-0.203	$1.65x10^{-02}$
	CD3E	-0.099	$3.50x10^{-02}$	-0.063	$2.05x10^{-1}$	-0.128	$1.00x10^{-01}$	-0.145	$8.96x10^{-02}$
	CD2	-0.06	$1.98x10^{-01}$	-0.02	$6.93x10^{-01}$	-0.005	$9.50x10^{-01}$	-0.067	$3.92x10^{-01}$
Th1	T-bet (TBX21)	-0.026	$5.83x10^{-01}$	0	$9.93x10^{-01}$	0.013	$8.67x10^{-01}$	0.026	$7.57x10^{-01}$
	STAT4	0.023	$6.23x10^{-01}$	0.05	$3.13x10^{-01}$	0.024	$7.58x10^{-01}$	0.032	$7.05x10^{-01}$
	STAT1	0.002	$9.70x10^{-01}$	-0.107	$2.16x10^{-02}$	0.178	$2.15x10^{-02}$	0.253	$2.63x10^{-03}$
	IFN-γ (IFNG)	-0.038	$4.16x10^{-01}$	-0.032	$5.16x10^{-01}$	-0.021	$7.88x10^{-01}$	0.041	$6.28x10^{-01}$
	TNF-α (TNF)	-0.089	$5.80x10^{-02}$	-0.045	$3.70x10^{-01}$	-0.051	$5.11x10^{-01}$	-0.040	$6.38x10^{-01}$
Th2	GATA3	-0.083	$7.55x10^{-01}$	-0.085	$8.86x10^{-02}$	-0.011	$8.86x10^{-01}$	-0.060	$4.80x10^{-01}$
	STAT6	0.107	$2.22x10^{-02}$	0.087	$7.87x10^{-02}$	0.148	$5.69x10^{-02}$	0.123	$1.49x10^{-01}$
	STAT5A	0.032	$4.88x10^{-01}$	0.014	$7.75x10^{-01}$	0.063	$4.18x10^{-01}$	0.098	$2.52x10^{-01}$
	IL13	-0.076	$1.06x10^{-01}$	-0.058	$2.47x10^{-01}$	-0.186	$1.64x10^{-02}$	-0.142	$9.52x10^{-02}$
Tfh	BCL6	0.069	$1.40x10^{-01}$	0.085	$8.90x10^{-02}$	0.191	$1.36x10^{-02}$	0.219	$9.46x10^{-03}$
	IL21	-0.069	$1.39x10^{-01}$	-0.068	$1.74x10^{-01}$	0.154	$4.77x10^{-02}$	0.134	$1.17x10^{-01}$
Th17	STAT3	0.232	$5.22x10^{-07}$	0.247	$4.88x10^{-07}$	0.366	$1.49x10^{-06}$	0.429	$1.33x10^{-07}$

	IL17A	0.095	$4.22x10^{-02}$	0.09	$7.02x10^{-02}$	0.048	$5.42x10^{-01}$	0.044	$6.07x10^{-01}$
Treg	FOXP3	-0.087	$6.20x10^{-02}$	-0.057	$2.50x10^{-01}$	-0.118	$1.31x10^{-01}$	-0.105	$2.17x10^{-01}$
	CCR8	0.043	$5.79x10^{-01}$	-0.008	$8.77x10^{-01}$	0.043	$5.79x10^{-01}$	0.085	$3.20x10^{-01}$
	STAT5B	0.171	$2.36x10^{-04}$	0.177	$3.42x10^{-04}$	0.327	$1.93x10^{-05}$	0.387	$2.55x10^{-06}$
	TGFβ (TGFB1)	-0.131	$5.08x10^{-03}$	-0.122	$1.39x10^{-02}$	-0.221	$4.31x10^{-03}$	-0.275	$1.04x10^{-03}$
T cell exhaustion	PD-1 (PDCD1)	-0.12	$1.01x10^{-02}$	-0.109	$2.79x10^{-02}$	-0.130	$9.39x10^{-02}$	-0.172	$4.24x10^{-02}$
	CTLA4	0.046	$3.27x10^{-01}$	-0.045	$3.63x10^{-01}$	0.019	$8.08x10^{-01}$	0.032	$7.10x10^{-01}$
	LAG3	-0.105	$2.49x10^{-02}$	-0.89	$7.46x10^{-02}$	-0.151	$5.30x10^{-02}$	-0.153	$7.13x10^{-01}$
	TIM-3 (HAVCR2)	-0.156	$8.39x10^{-04}$	-0.151	$2.30x10^{-03}$	-0.151	$5.24x10^{-02}$	-0.102	$2.31x10^{-01}$
	GZMB	-0.086	$6.70x10^{-02}$	0.094	$5.92x10^{-02}$	-0.158	$4.15x10^{-02}$	-0.131	$1.23x10^{-01}$

COAD, colon adenocarcinoma; READ, rectum adenocarcinoma; CD, Cluster of Differentiation; CCL2, C-C Motif Chemokine Ligand 2; INOS (NOS2), Nitric Oxide Synthase 2 (Inducible Nitric Oxide Synthase); IRF5, Interferon Regulatory Factor 5; COX2 (PTGS2), Cyclooxygenase 2 (Prostaglandin-Endoperoxide Synthase 2); VSIG4, V-Set and Immunoglobulin Domain Containing 4; MS4A4A, Membrane Spanning 4-Domains A4A; CXCL2, C-X-C Motif Chemokine Ligand 2; OLR1 (LOX1), Oxidized Low-Density Lipoprotein Receptor 1 (Oxidized Low-Density Lipoprotein Receptor 1); KIR2DL1, Killer Cell Immunoglobulin Like Receptor 2DL1; HLA-DPB1, Major Histocompatibility Complex Class II DP β1; BDCA-1 (CD1C), Blood Dendritic Cell Antigen 1 (Cluster of Differentiation 1C); T-bet (TBX21), T-Box Transcription Factor 21; STAT4, Signal Transducer and Activator of Transcription 4; IFN-γ (IFNG), Interferon Gamma; TNF-α, Tumor Necrosis Factor α; GATA3, GATA Binding Protein 3; STAT, Signal Transducer and Activator of Transcription; IL, Interleukin; FOXP3, Forkhead Box P3; CTLA4, Cytotoxic T-Lymphocyte Associated Protein 4; LAG3, Lymphocyte Activation Gene 3; TIM-3 (HAVCR2), T-cell Immunoglobulin and Mucin Domain-Containing Protein 3 (Hepatitis A Virus Cellular Receptor 2).