SUPPLEMENTAL FIGURE LEGENDS AND TABLES

Supplemental Figure 1. Characterization of the CD4-Cre/STING$^{flox/flox}$ mouse phenotype. $CD4^+$ and $CD8^+$ T cells were collected from the spleens of CD4-Cre/STING$^{flox/flox}$ (TKO) mice and littermate control (WT) mice using magnetic isolation. RNA and protein were collected for PCR and western blot analysis. (A-B) The STING mRNA and protein levels in $CD4^+$ (A) and $CD8^+$ T cells (B) were measured by PCR and western blotting. (C-D) The IFN-β, ISG15 and IFIT1 mRNA expression in $CD4^+$ (C) and $CD8^+$ T cells (D) isolated from TKO and WT mice was detected after 3 hours of treatment with the STING agonists cGAMP (2'-3'-cGAMP, 1 μg/mL), DMXAA (5,6-dimethylxanthenone-4-acetic acid, 1 μg/ml) and CMA (10-carboxymethyl-9-acridanone, 62.5 μg/mL). (E-F) Statistical graph showing the comparison of the proportions of $CD4^+$ or $CD8^+$ T cells in the thymus, spleen and lymphoid node (LN) tissues of WT or TKO mice as determined by flow cytometry. The results are representative of three independent experiments. All values are shown as the mean ± SEM. $*P < 0.05$, $**P < 0.01$, $***P < 0.001$, Students' *t* test.

Supplemental Figure 2. The iTreg characteristics. (A) Gating strategy for the assessment of the Treg population induced from human or murine T cells *in vitro* by flow cytometry. First, the live cells were gated from the FVS- cell population. Next, the $CD4^+CD25^{high}$ cell population were obtained from the FVS- cell population, and then the $CD4^+CD25^{high}FOXP3^+$ cells from the $CD4^+CD25^{high}$ cell population were defined as iTreg. **(B)** Another gating strategy for the frequency of $CD4^+FOXP3^+$ Treg gated from $CD4^+FVS^-$ cells, to detect the frequency of Treg population in peripheral blood or tumor tissues from patients or mice in vivo, or to detect the level of TGF-β, IL-10 and CTLA-4 of the Tregs *in vitro.* **(C-D)** The levels of TGF-β, IL-10 and

CTLA-4 in the $CD4^+FOXP3^+$ Treg population induced by **(C)** OE-STING, OENC lentivirus or **(D)** CMA (62.5ug/ml) were measured using a flow cytometer, and representative data is shown, FMO, Fluorescence minus one. **(E)** Suppression of iTreg on T cell ($CD4^+$ and $CD8^+$ T cells) proliferation was detected by CSFE labeling and flow cytometry, the CSFE-labeled T cells were cocultured with OE-STING-induced iTreg at different ratios of for 5 days, and representative data is shown.

Supplemental Figure 3 Tumor cells promote iTreg generation and STING signaling activation *in vitro.* $CD4^+$ naïve T cells from the PBMCs of healthy donors were cocultured with irradiated HeLa and SiHa cells at a ratio of 30:1 in conditioned medium for 5 days and harvested for subsequent assessment. **(A)** The representative FACS plot and statistical graph show the proportions of Tregs. **(B)** Western blotting showed the levels of the indicated proteins, including STING, p-TBK1, p-IRF3 and FOXP3, in the harvested T cells; β-actin was included as a control. **(C)** The representative FACS plot and statistical graph show the proportions of $CD4^+CD25^{high}FOXP3^+$ Tregs induced from human $CD4^+$ naïve T cells in conditioned medium supplemented with 2'-3'-cGAMP (cGAMP, 1 μg/mL) or 10-carboxymethyl-9-acridanone (CMA, 62.5 μg/ml). **(D)** Western blotting showed the levels of STING, p-TBK1, TBK1, p-IRF3, IRF3 and FOXP3 as detected by the indicated antibodies in the harvested T cells under different treatments. The results are representative of at least three independent experiments. All values are shown as the mean ± SEM. $*P < 0.05$, $**P < 0.01$, $***P < 0.001$, Students' t test. The proliferation of CSFE-labeled T cells was detected by FACS staining. **(E)** FACS results showed that TC-1 tumor cell could induce CD4+ T cells to Tregs. The results are representative of at least three independent experiments. **(F)** Western blotting showed that

TC-1 tumor cells could induce the phosphorylation of IRF3 and TBK1 when cultured with CD4+ naive T cells. **(G)** Human T cell including $CD4^+$ and $CD8^+$ T cells were transfected with the lenti-STING-overexpression (OE-STING) and corresponding control (OENC) vectors or in the presence of CMA for 5 days. **(H)** Mouse T cells including $CD4^+$ and $CD8^+$ T cells from WT or TKO mice following treatment with or without DMXAA (1ug/ml). **(I)** The human $CD4^+$ naïve T cells transfected with the lenti-STING knockdown (STING-KD) and corresponding control (NC) vectors following treatment with or without human TGF-β (5ng/ml). Upper panel, the proliferation of $CD4^+$ $CD25^{high}$ $FOXP3^+$ cells; Lower panel, the proliferation of $CD25^{high}$ $FOXP3^-$ cells. **(J)** The mouse T cells from WT or TKO mice following treatment with or without mouse TGF- β. Upper panel, the proliferation of $CD4^+$ $CD25^{high}$ $FOXP3^+$ cells; Lower panel, the proliferation of $CD25^{high}$ $FOXP3^-$ cells.

Supplemental Figure 4 STING-TBK1-IRF3-mediated FOXP3 expression is not associated with IFN-β. (A) Western blotting showed the levels of STING, p-TBK1, TBK1, p-IRF3, IRF3 and FOXP3 in $CD4^+$ T cells cultured in conditioned medium with IFN-β (10ng/mL) or not for 3 days. **(B)** Western blotting showed the levels of p-TBK1, TBK1, p-IRF3, IRF3 and FOXP3 in Tregs induced from human $CD4^+$ naïve T cells transfected with the TBK1-KD, IRF3-KD and corresponding control lentiviruses. **(C)** Forced exogenous STING expression in human $CD4^+$ T cells transfected with TBK1-KD or IRF3-KD lentiviruses and cultured in conditioned medium for 3 days. The expression of STING, p-TBK1, TBK1, p-IRF3, and IRF3 was assessed by immunoblotting, and β-actin was included as a control. The results are representative of at least three independent experiments. **P*<0.05, ***P*<0.01, ****P*< 0.001, Students' t test.

Supplemental Figure 5 STING promotes the phosphorylation of Smad3 and STAT5 via the TBK1 and IRF3 pathways. (A-D) Quantified Western blotting data showing that the phosphorylation levels of Smad3 and STAT5 were decreased in CD4+ T cells with STING or IRF3 knockout. **(E)** Human $CD4^+$ naïve T cells from peripheral blood mononuclear cells were cultured in CM medium with or without TGF-β, transfected with the lenti-STING knockdown (STING-KD) vector and the corresponding lenti-control vectors (NC) and then treated with or without TGF-β for 3 days. Representative FACS plots show the MFI of p-STAT5 gated on $CD4^+$ $CD25^{high}$T cells. (**F)** Murine $CD4^+$ naïve T cells from the spleen of WT or TKO mice were cultured in CM medium with or without mouse TGF-β for 3 days. The representative FACS plots show the MFI of p-STAT5 gated on $CD4^+CD25^{high}$ T cells. **(G)** Western blotting showed the levels of p-STAT5, STAT5, p-Smad3 and Smad3 in Tregs induced from human $CD4^+$ naïve T cells transfected with the TBK1-KD, IRF3-KD or control lentivirus vector. **(H)** Forced exogenous STING expression in human $CD4^+$ T cells transfected with TBK1-KD or IRF3-KD lentiviruses and cultured in conditioned medium for 3 days. The expression levels of p-STAT5, STAT5, p-Smad3 and Smad3 in the harvested cells were assessed by immunoblotting. **(I)** Human $CD4^+$ naïve T cells were treated with a p-STAT3 inhibitor (cryptotanshinone, 50 ng/ml), p-STAT5 inhibitor (STAT5-IN-1, 100 ng/ml) or DMSO (control group) in conditioned medium supplemented with CMA (10-carboxymethyl-9-acridanone, 62.5 μg/mL) or dimethyl sulfoxide (DMSO, control group) for 5 days. The indicated proteins were measured by immunoblotting. The results are representative of at least three independent experiments. All values are shown as the mean ± SEM. $*P < 0.05$, $**P < 0.01$, $***P < 0.001$, Students' t test.

Supplemental Figure 6 Tumor-derived exosome promote iTregs through STING-TBK1-IRF3 axis.

The proportion of $CD4^+$ $CD25^{high}$ $FOXP3^+$ Tregs induced from human $CD4^+$ naïve T cells transfected with the lenti-TBK1 knockdown (TBK1-KD), lenti-IRF3-KD and corresponding control (NC-KD) vectors in the presence of T-EXOs from HeLa cells. **(A-B)** the representative FACS plot and statistical graph. The results are representative of at least three independent experiments. All values are shown as the

mean ± SEM. **P* < 0.05, ***P* < 0.01, ****P* < 0.001, Student's t test.

Supplemental Figure 7 STING signaling is activation in tumor-infiltrating lymphocytes in CC patients. (A) The FACS plot and statistical graph show the proportions of $CD4^+$ $FOXP3^+$ Tregs in TILs and PBMCs from the same CC patients (n = 3). **(B)** Western blotting showed the expression of STING signaling pathway proteins, including STING, p-TBK1, TBK1, p-IRF3, IRF3 and FOXP3, in PBMCs and tumor-infiltrating lymphocytes (TILs) from the same CC patients (n = 3). β-actin was included as the immunoblot loading control. **(C)** Gene expression related to STING signaling and Treg differentiation in the circuiting lymphocytes and TILs of CC patients. STING, TGF-β, FOXP3, ISG20, ISG54, ISG56, DUSP4, ICOS, JUNB, PAK2, CD28 and BATF in PBMCs and TILs from the same CC patients were measured by quantitative RT-PCR analysis (n = 3). The results are representative of at least three independent experiments. All values are shown as the mean ± SEM. **P* < 0.05, ***P* < 0.01, ****P* < 0.001, Student's t test.

Supplemental Figure 8 STING knockdown or knockout infleunces STING-mediated NF-κB signalling in T cells. (A) Western blotting showed the levels of p-p65 and p65 in iTregs induced from human $CD4^+$ naïve T cells transfected with the STING-KD or control lentivirus vector, or treated with CMA (62.5 ug/ml) or in CM alone for 3 days. **(B)** Mouse iTregs induced from CD4+ naive T cells of WT or TKO mice were treated with control or DMXAA (1 μg/ml) in CM for 3 days, then cells were harvested for Western blot analyses using p-p65, p65, p-IkBα and IkBα antibodies.

Supplemental TABLES

Supplemental Table 1. Clinical information for the patients with cervical cancer.

Characteristics	No. of patients (%)
Total case	197
Age (Years)	
Median, Range	44.28-79
≤44	106 (53.8%)
>44	91 (46.2%)
Tumor grade	
G1	16 (8.1%)
G2	107 (54.3%)
G3	66 (33.5%)
G4	8 (4.1%)
Pathological tumor (T) status	
T1	147 (74.6%)
T2–4	50 (25.4%)
Pathological node (N) status	
N0	173 (87.8%)
N1	24 (12.2%)
Pathological metastasis (M) status	
M0	197 (100.0%)
M1	0 (0%)
Clinical stage	
I	127 (64.5%)
II-IV	70 (35.5%)
HPV	
HPV+	194 (98.5%)
HPV-	3 (1.5%)
Death	
No	171 (86.8%)
Yes	26 (13.2%)
Therapy after surgery	
Surgery alone	45 (22.8%)
Radiation therapy alone	41 (20.8%)
Surgery + radiation therapy	27 (13.7%)
Surgery + radiation therapy + chemotherapy	84 (42.6%)
No	107 (78.7%)

Abbreviations: T, tumor; N, node; M, metastasis; TNM, tumor-node-metastasis.

Supplemental Table 2. Association of the expression of STING, FOXP3, and CD8 in tumor cells with the clinicopathological features of 197 patients with cervical cancer

Clinicopathologic feature	Total case	High STING expression (%)	*P*[a]	High FOXP3 expression (%)	*P*[a]	High CD8 expression (%)	*P*[a]
Age							
≤44 (y)	106	38 (44.7%)	0.094	49 (57.6%)	0.211	42 (57.5%)	0.729
>44 (y)	91	63 (56.8%)		54 (48.4%)		53 (60.2%)	
WHO grade							
G1	16	7 (43.8%)	0.973	7 (43.8%)	0.260	10 (66.7%)	0.919
G2	107	56 (52.3%)		62 (57.9%)		53 (59.6%)	
G3	66	34 (51.5%)		29 (43.9%)		30 (56.6%)	
G4	8	4 (50%)		5 (62.5%)		3 (60.0%)	
T status							
T1	147	78 (53.1%)	0.388	82 (55.8%)	0.092	73 (62.4%)	0.191
T2–4	50	23 (46.0%)		21 (42.0%)		23 (51.1%)	
N status							
N0	173	84 (48.6%)	**0.041**	90 (52.0%)	0.844	85 (61.2%)	0.228
N1	24	17 (70.8%)		13 (54.2%)		11 (47.8%)	
Clinical stage							
I	127	57 (44.9%)	**0.016**	63 (49.6%)	0.311	76 (69.1%)	**<0.001**
II-IV	70	44 (62.9%)		40 (57.1%)		20 (38.5%)	

Note: **P* < 0.05, a, Pearson's X^2 test.

Supplemental Table 3 Cox regression analysis of disease-free survival and overall survival in patients with cervical cancer

Factors	Disease-free survival		Overall survival	
	HR (95%CI)	***P* ***	**HR (95%CI)**	***P* ***
Univariate Cox regression analysis				
Age, years (≤44/>44)	0.978 (0.653–1.465)	0.913	0.938 (0.413–2.128)	0.878
WHO grade (1/2/3/4)	1.273 (0.656–2.47)	0.475	1.115 (0.609–2.042)	0.724
Tumor (T) status (1/2–4)	0.077 (0.01–0.597)	0.063	0.070 (0.009–0.527)	0.051
Nodal (N) status (0/1)	3.743 (1.439–9.737)	**0.007**	2.913 (1.153–7.361)	**0.024**
Clinical stage (I/II-IV)	4.260 (1.777–10.213)	**0.001**	4.596 (1.988–10.622)	**0.000**
STING score (low/high)	3.695 (1.038–13.158)	**0.044**	3.787 (1.422–10.087)	**0.008**

FOXP3-positive cells (low/high)	5.545 (1.634–18.817)	**0.006**	0.964 (0.443–2.097)	0.926
CD8-positive cells (low/high)	0.340 (0.126–0.921)	**0.034**	0.310 (1.116–0.827)	**0.019**
Multivariate Cox regression analysis				
Tumor (T) status (1/2–4)	0.000 (0.000–5.28E171)	0.952	0 (0.000–8.42E169)	0.951
Nodal (N) status (0/1)	1.556 (0.514–4.708)	0.433	1.246 (0.411–3.78)	0.698
Clinical stage (I/II-IV)	2.447 (0.874–6.854)	0.088	2.822 (1.028–7.75)	**0.044**
STING score (low/high)	7.632 (1.699–34.281)	**0.008**	8.632 (1.931–38.59)	**0.005**
FOXP3-positive cells (low/high)	3.494 (0.973–12.533)	0.055	3.678 (1.032–13.104)	**0.045**
CD8-positive cells (low/high)	0.466 (0.163–1.333)	0.155	0.418 (0.148–1.18)	0.100

*Univariate analysis, $P<0.05$ considered statistically significant. Abbreviations: HR, hazard ratio; 95% CI, 95% confidence interval.
STING (low/high), FOXP3 (low/high) and CD8 (low/high) is divided by using a X-tile software based a more objective cutoff point.

Supplemental Table 4 Antibodies for immunoblot assays

Antibody	Source	Identifier	Location
For Human			
CD4 PerCP-cyanine 7	eBioscience	25-0048-42	San Diego, CA, USA
CD8 PE-cyanine 7	eBioscience	25-0088-42	San Diego, CA, USA
CD25 PE	eBioscience	12-0259-42	San Diego, CA, USA
FOXP3 APC	eBioscience	17-4776-42	San Diego, CA, USA
CD8 PE	eBioscience	12-0089-42	San Diego, CA, USA
IFN-γ APC	eBioscience	17-7319-82	San Diego, CA, USA
IL-17 FITC	eBioscience	11-7179-42	San Diego, CA, USA
TGF-β FITC	Biolegend	349606	San Diego, CA, USA
CTLA-4 APC-eFlour780	eBioscience	47-1529-42	San Diego, CA, USA
IL-10 -PE	eBioscience	12-7108-82	San Diego, CA, USA
STING antibody	Cell Signaling Technology	13647S	Danvers, MA, USA
p-TBK1 antibody	Cell Signaling Technology	5483S	Danvers, MA, USA
TBK1 antibody	Cell Signaling Technology	3504S	Danvers, MA, USA
p-IRF3 antibody	Cell Signaling Technology	37829S	Danvers, MA, USA
IRF3 antibody	Protein Tech	11312-1-AP	Wuhan, Hu Bei, China
TGFβ antibody	Cell Signaling Technology	3709S	Danvers, MA, USA
p-Smad3 antibody	Cell Signaling Technology	9520S	Danvers, MA, USA
Smad3 antibody	Cell Signaling Technology	9523S	Danvers, MA, USA
p-STAT5 antibody	Abcam	Ab32364	Cambridge, MA
STAT5 antibody	Santa Cruz	SC-74442	Dallas, TX, USA
FOXP3 antibody	Santa Cruz	SC-53876	Dallas, TX, USA
CD8 antibody	Santa Cruz	SC-1177	Dallas, TX, USA
β-actin antibody	Santa Cruz	SC-47778	Dallas, TX, USA
Goat anti-mouse IgG (H+L), HRP conjugate	ProteinTech	SA00001-1	Wuhan, Hu Bei, China
Goat anti-rabbit IgG (H+L), HRP conjugate	ProteinTech	SA00001-2	Wuhan, Hu Bei, China
p-p65	Cell Signaling Technology	3033S	Danvers, MA, USA
p65	Cell Signaling Technology	8242T	Danvers, MA, USA
p100/p52	Cell Signaling Technology	4882T	Danvers, MA, USA
HPV16E6 antibody	Santa Cruz	SC-1584	Dallas, TX, USA
HPV16E7 antibody	Santa Cruz	SC-6981	Dallas, TX, USA
HPV18E6 antibody	Santa Cruz	SC-365089	Dallas, TX, USA
HPV18E7 antibody	Santa Cruz	SC-365035	Dallas, TX, USA
CCL22	LSBio	LS-C408386	Seattle WA
cGAS	Cell Signaling Technology	15102T	Danvers, MA, USA
For mouse			
CD4 BV421	Biolegend	100544	San Diego, CA,USA
CD25 PE	Biolegend	101904	San Diego, CA,USA
FOXP3 AF647	BD	560401	Franklin Lakes, NJ, USA
P-IRF3 antibody	Cell Signaling Technology	4947S	Danvers, MA, USA

IRF3 antibody	Cell Signaling Technology	4302S	Danvers, MA, USA
p-TBK1 antibody	Cell Signaling Technology	5483S	Danvers, MA, USA
TBK1 antibody	Cell Signaling Technology	3504S	Danvers, MA, USA
P-STAT5 antibody	Cell Signaling Technology	9351S	Danvers, MA, USA
STAT5 antibody	Cell Signaling Technology	94205S	Danvers, MA, USA
P-Smad3 antibody	Cell Signaling Technology	9520S	Danvers, MA, USA
Smad3 antibody	Cell Signaling Technology	9523S	Danvers, MA, USA
CD8	Cell Signaling Technology	98941S	Danvers, MA, USA
FOXP3	Cell Signaling Technology	12653T	Danvers, MA, USA
p-p65	Cell Signaling Technology	3033S	Danvers, MA, USA
p65	Cell Signaling Technology	8242T	Danvers, MA, USA
IkBα	Cell Signaling Technology	9247s	Danvers, MA, USA
p-IkBα	Cell Signaling Technology	9246s	Danvers, MA, USA

Supplemental Table 5. Primers used for qRT-PCR

Gene	Forward (F) primers	Reverse (R) primers
Human		
STING	5'- CCAGAGCACACTCTCCGGTA-3'	5'- CGCATTTGGGAGGGAGTAGTA-3'
FOXP3	5'- GTGGCCCGGATGTGAGAAG-3'	5'- GGAGCCCTTGTCGGATGATG-3'
TGF-β	5'- GGCCAGATCCTGTCCAAGC -3'	5'- GTGGGTTTCCACCATTAGCAC -3'
TBK1	5'- TGGGTGGAATGAATCATCTACGA -3'	5'- GCTGCACCAAAATCTGTGAGT -3'
IRF3	5'- AGAGGCTCGTGATGGTCAAG -3'	5'- AGGTCCACAGTATTCTCCAGG -3'
SOCS1	5'- TTTTCGCCCTTAGCGTGAAGA -3'	5'- GAGGCAGTCGAAGCTCTCG -3'
SOCS3	5'- CCTGCGCCTCAAGACCTTC-3'	5'- GTCACTGCGCTCCAGTAGAA-3'
ISG15	5'-TCCTGGTGAGGAATAACAAGGG-3'	5'- GTCAGCCAGAACAGGTCGTC-3'
ISG54	5'-GGAGGGAGAAAACTCCTTGGA-3'	5'-GGCCAGTAGGTTGCACATTGT-3'
ISG56	5'- TCAGGTCAAGGATAGTCTGGAG-3'	5'-AGGTTGTGTATTCCCACACTGTA-3'
Mouse		
FOXP3	5'- CCCATCCCCAGGAGTCTTG-3'	5'-ACCATGACTAGGGGCACTGTA-3'
IFN-β	5'- CAGCTCCAAGAAAGGACGAAC-3'	5'- GGCAGTGTAACTCTTCTGCAT-3'
IFIT1	5'- CTGAGATGTCACTTCACATGGAA-3'	5'- GTGCATCCCCAATGGGTTCT-3'
ISG15	5'- GGTGTCCGTGACTAACTCCAT-3'	5'- TGGAAAGGGTAAGACCGTCCT-3'
STING	5'-GGTCACCGCTCCAAATATGTAG-3'	5'- CAGTAGTCCAAGTTCGTGCGA-3'
STING-Flox	5'-CTGCTGGTGAGTGACTTTTTGAAC-3'	5'-ATGGGCTACTCTTGGATACACCTC-3'.
CD4-Cre	5'- AGGTTCGTTCACTCATGGA-3'	5'-TCGACCAGTTTAGTTACCC-3'

Supplemental Table 6. Sequences used for shRNAs of pLKO lentiviral vector

Gene	Sequences
STING shRNA-1	5'-CGGGTTTACAGCAACAGCATCTATCTCGAGATAGATGCTGTTGC TGTAAACTTTTT-3'
STING shRNA-2	5'-CCGGGCTGTATATTCTCCTCCCATTCTCGAGAATGGGAGGAGAA TATACAGCTTTTT
STING shRNA-3	5'-CCGGCATGGTCATATTACATCGGATCTCGAGATCCGATGTAATAT GACCATGTTTTT
TBK1 shRNA-1	5'-CCGGGCAGAACGTAGATTAGCTTATCTCGAGATAAGCTAATCTA CGTTCTGCTTTTT-3'
TBK1 shRNA-2	5'-CCGGCCAGGAAATATCATGCGTGTTCTCGAGAACACGCATGATA TTTCCTGGTTTTT-3'
TBK1 shRNA-3	5'-CCGGGCGGCAGAGTTAGGTGAAATTCTCGAGAATTTCACCTAA CTCTGCCGCTTTTT-3
IRF3 shRNA-1	5'-CCGGGATCTGATTACCTTCACGGAACTCGAGTTCCGTGAAGGTA ATCAGATCTTTTT-3'

Supplemental Table 7. Reagents and software

Reagent	Source	Identifier	Location
RPMI medium 1640 basic (1X)	Gibco	LOT# 8117203	Suzhou, JS, China
X-VIVO-15 medium	Lonza	CAT# 04-418Q	Walkersville, MD, USA
DMEM basic	Gibco	CAT# 2117207	Suzhou, JS, China
MagniSort™ Mouse CD4 T cell Enrichment Kit	Invitrogen	CAT#8804-6821-74	Carlsbad, CA, USA
MagniSort™ Human CD4 Naïve T cell Enrichment Kit	Invitrogen	CAT#8804-6814-74	Carlsbad, CA, USA
Collagenase type IV	Sigma-Aldrich	CAT# C5138-MG100	St. Louis, MO, USA
Interleukin-2	Beijing Four Rings	CAT# S10970017	Beijing, China
Anti-hCD3-purified mouse Monoclonal IgG1	R&D Systems	CAT# MAB100	Minneapolis, MN, USA
Polybrene	Abbott Laboratories Corp	LOT# SC-134220	Chicago, Illinois, USA
TRIzol reagent	Invitrogen	REF# 15596026	Carlsbad, CA, USA
RevertAid First-Strand cDNA Synthesis Kit	Thermo Scientific	CAT# K1622	Waltham, MA, USA
ChamQ SYBR qPCR Master Mix	Vazyme Biotechnology	LOT# Q311-02	Nanjing, JS, China
RIPA Lysis Buffer	Beyotime	LOT# P0013	Shanghai, China
CMA	Sigma	CAT# 17927	St. Louis, MO, USA
DMXAA	APEXBIO	CAT# A8233	Houston, USA
2'-3'-cGAMP	InvivoGene	CAT# tlrl-nacga23-02	San Diego, CA, USA
Human IFN-β	R&D	CAT#8499-IF-010	Minneapolis, MN, USA
Mouse IFN-β	R&D	CAT#8234-MB-010	Minneapolis, MN, USA
FVS-AF780	BD Bioscience	CAT# 565388	San Jose, CA, USA
Mouse IFN-γ ELISA kit	Invitrogen	CAT# 88731488	Carlsbad, CA, USA
2'-3'-cGAMP ELISA kits	Cayman Chemical	CAT#501700	Michigan, USA

Software and Algorithm	Source	Identifier	Location
FlowJo V10	FlowJo, LLC	https://www.flowjo.com/	Ashland, Oregon
GraphPad Prism 8	GraphPad Software	https://www.graphpad.com/scientific-software/prism/	La Jolla, CA, USA
Image Lab	Bio-Rad Laboratories	http://www.biorad.com/en-us/product/image-lab-software	Hercules, CA, USA
IBM SPSS Statistics 19.0	IBM Analysis	https://www.ibm.com/analytics/data-science/predictive-analytics/spss-statistical-software	Chicago, IL, USA
Adobe Photoshop CS6	Adobe Systems	https://www.adobe.com	San Jose, CA, USA
Adobe Illustrator CC	Adobe Systems	https://www.adobe.com	San Jose, CA, USA
HALO	lndica Labs	https://www.indicalab.com/halo	New Mexico USA

Supplemental Table 8. Abbreviations

Abbreviation	Full definition
CC	Cervical cancer
HPV	Human papillomavirus
STING	Stimulator of interferon genes
TBK1	TANK-binding kinase 1
IRF3	Interferon regulatory factor 3
FOXP3	Forkhead box protein 3
Treg	Regulatory T cells
NIL	Nontumor-infiltrating tissue
TIL	Tumor-infiltrating lymphocytes
PBMC	Peripheral blood mononuclear cells
T-EXO	Tumor-derived exosomes
C-EXO	Control-derived exosomes
IFN-β	Interferon beta
TGF-β	Transforming growth factor beta
CMA	10-carboxymethyl-9-acridanone
DMXAA	5,6-dimethylxanthenone-4-acetic acid
2'-3'-cGAMP	Cyclic [G(2',5')pA(3',5')p]
WT	Wild-type