Supplementary Material

Exploring Potential Roles of Long Non-Coding RNAs in Cancer Immunotherapy: A Comprehensive Review

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Supplementary Table 1: Types of adoptive cell therapies: comparing CAR-T cells, TCR-engineered T-cells, and TILs.

Type of Therapy	Target Diseases	Mechanism of Action	Key Examples	Clinical Status	Efficacy and Outcomes	References
CAR-T cells	Hematological malignancies (acute lymphoblastic leukemia, lymphoma)	Engineered T-cells with chimeric antigen receptors (CARs) recognizing specific cancer antigens	Kymriah (tisagenlecleucel), Yescarta (axicabtagene ciloleucel)	FDA-approved for specific indications	High response rates in some cancers, improved survival, but potential for relapse	(1)
TCR-engineered T-cells	Solid tumors (melanoma, synovial sarcoma, mesothelioma)	Engineered T-cells with T cell receptors (TCRs) recognizing specific tumor antigens	No commercially available products, several investigational therapies in clinical trials	Early clinical trials, promising results in some patients, but limited data on efficacy	Potential for CRS, neurotoxicity, graft-versus-host disease (GVHD)	(2)
Tumor-infiltrating lymphocytes (TILs)	Solid tumors (melanoma, head and neck cancer, sarcoma)	Expansion of tumor-specific T-cells isolated from patient's tumor	No commercially available products, individual patient-specific therapies in clinical trials	Early clinical trials, encouraging results in some patients, but complex manufacturing process	Limited data on efficacy, potential for CRS, GVHD, and other immune-related adverse events	(3)
CAR-NK cells	Hematological malignancies and solid tumors	Engineered natural killer (NK) cells with CARs	Investigational therapies in early clinical trials	Preclinical data suggests potential efficacy, safety profile still under investigation	Potential for CRS, off-target toxicities	(4)
TCR-gamma delta T-cells	Solid tumors and hematological malignancies	Engineered gamma delta T-cells with TCRs recognizing tumor antigens	Investigational therapies in early clinical trials	Preclinical data suggests potential for wider antigen recognition, safety profile still under investigation	Potential for CRS, GVHD	(5)
CAR-Macrophages	Solid tumors	Engineered macrophages with CARs recognizing tumor antigens	Preclinical research stage	Early research suggests potential for tumor targeting and immune activation, safety profile unknown	Potential for off-target toxicities, immune suppression	(6)
CAR-Dendritic cells	Solid tumors	Engineered dendritic cells with CARs to activate T cell responses	Preclinical research stage	Early research suggests potential for antigen presentation and T cell priming, safety profile unknown	Potential for off-target toxicities, autoimmune reactions	(7)

TCR-engineered regulatory T-cells (Tregs)	Autoimmune diseases and inflammatory conditions	Engineered Tregs with TCRs recognizing specific antigens to suppress immune response	Preclinical research stage	Early research suggests potential for targeted immune suppression, safety profile unknown	Potential for off-target immune suppression, loss of immune control	(8)
TCR gene editing	Various diseases, including cancer and genetic disorders	Editing genes within T-cells to create new TCRs recognizing specific antigens	Preclinical research stage	Early research suggests potential for personalized therapy, safety profile and long-term effects unknown	Potential for off-target effects, genotoxicity	(9)
Universal off-the-shelf cell therapies	Various diseases	Developing standardized, allogeneic T cell or NK cell products for broader patient access	Preclinical research stage	Early research suggests potential for wider accessibility and reduced manufacturing time, safety profile and long-term effects unknown	Potential for GVHD, rejection, and limited efficacy	(10)

Supplementary Table 2: Cancer vaccines: differentiating between preventive and therapeutic vaccines.

Vaccine Type	Vaccine Name	Target Cancer	Mechanism of Action	Key Findings/Efficacy	References
Preventive	Gardasil	Cervical, vulvar, vaginal, anal, and head and neck cancers	Triggers immune response against HPV types 16 and 18	Reduces risk of HPV-related cancers by up to 90%	(11)
Preventive	Cervarix	Cervical cancer	Triggers immune response against HPV types 16 and 18	Reduces risk of cervical cancer by up to 80%	(12)
Therapeutic	Sipuleucel-T (Provenge)	Prostate cancer	Uses modified patient's own immune cells to attack cancer cells	Improves overall survival in advanced prostate cancer by a few months	(13)
Therapeutic	Pembrolizumab (Keytruda)	Various cancers (melanoma, lung, bladder, etc.)	Blocks immune checkpoint to activate T-cells against cancer	Significant tumor shrinkage and improved survival in various cancers	(14)
Therapeutic	CAR T-cell therapy (e.g., Kymriah)	Leukemia and lymphoma	Genetically modifies T-cells to recognize and attack specific cancer cells	High remission rates in some blood cancers	(15)
Therapeutic	mRNA cancer vaccines (e.g., Moderna mRNA-4157)	Various cancers	Delivers tumor-specific mRNA to instruct immune cells to attack cancer	Early promising results in inducing immune response and tumor regression	(16)
Therapeutic	Dendritic cell vaccines (e.g., DCVax-L)	Various cancers	Uses patient's own dendritic cells loaded with tumor antigens to stimulate immune response	Mixed results, with some trials showing potential benefit	(17)
Preventive	Hepatitis B vaccine	Liver cancer	Prevents hepatitis B infection, reducing risk of liver cancer	Reduces liver cancer risk by over 70%	(18)
Preventive	Human papillomavirus (HPV) vaccines (Gardasil 9, Cervarix)	Cervical, vulvar, vaginal, anal, and head and neck cancers	Triggers immune response against multiple HPV types (including 16, 18, 31, 33, 45, 52, and 58)	Further reduces risk of HPV-related cancers compared to Gardasil/Cervarix	(19)
Therapeutic	Oncolytic virus therapy (e.g., T-VEC)	Various cancers	Uses genetically modified viruses to infect and kill cancer cells	Shows promising results in treating some cancers, but further research needed	(20)

Supplementary Table 3: Dysregulated expression of lncRNAs and their potential clinical implications in different cancers.

Cancer Type	lncRNA Name	Expression Pattern	Targeted Gene(s)	Functional Role	Ref.
Breast	TTN-AS1	Upregulated	DGCR8	Promotes migration and invasion	(21)
	LINC01787	Upregulated	pre-miR-125b	Promotes proliferation and migration	(22)
	LINC00899	Upregulated	miR-425	Inhibits proliferation, migration, and invasion	(23)
	NBAT1	Upregulated	DKK1/EZH2/PRC2	Promotes migration and invasion	(24)
	OTAIR	Upregulated	PRC2	Promotes invasiveness and metastasis	(25)
	ARNILA	Upregulated	Sox4	Promotes EMT, invasion and metastasis	(26)
	LINC00628	Upregulated	Bcl-2/Bax	Inhibits proliferation, invasion, and migration/Promotes apoptosis	(27)
	XIST	Upregulated	miR-155	Inhibits growth, migration, and invasion	(28)
	HOST2	Upregulated	let-7b	Promotes cell motility, migration, and invasion	(29)
	CASC2	Upregulated	miR-96-5p/SYVN1	Inhibits viability, migration and invasion/Promotes apoptosis	(30)
	LINC00115	Upregulated	miR-7	Promotes metastasis	(31)
	H19	Downregulated	miR-138	Inhibits proliferation, invasion, and migration	(32)
	Linc-ITGB1	Downregulated	N-cadherin/vimentin	Inhibits EMT, invasion and migration	(33)
	LINC01296	Downregulated	Bcl-2	Inhibits cell proliferation, metastasis	(34)
	SNHG14	Downregulated	miR-193a-3p	Inhibits invasion	(35)
	GHET1	Downregulated	N-cadherin/Vimentin	Inhibits cell proliferation, invasion, and migration	(36)
	LINC00673	Downregulated	B7-H6	Inhibits proliferation and metastasis	(37)
Lung	MALAT1	Upregulated	SR/PC2/hnRNP C	Induces proliferation and invasion	(38)
	HOTAIR	Upregulated	PRC2/LSD1	Induces proliferation and invasion	(39)
	H19	Upregulated	c-Myc/p53/miR-675	Induces NSCLC cell proliferation	(40)
	PVT1	Upregulated	miR-200a/miR-200b/MMP9	Induces proliferation	(41)
	ANRIL	Upregulated	P15/P21/KLF2	Induces proliferation and invasion	(42)
	LINC00473	Upregulated	CRTC/CREB	Induces growth of LKB1-inactivated NSCLC cells	(43)
	LINC00963	Upregulated	PGK1/CRTC/CREB	Promotes metastasis	(44)
	SOX2OT	Upregulated	EZH2	Promotes cell proliferation	(45)
	CAR10	Upregulated	YB-1/miR-203/30/SNAI	Induces proliferation	(46)
	BANCR	Downregulated	p38	Induces proliferation and migration	(47)
	PANDAR	Downregulated	PANDAR/NF-YA/Bcl-2	Induces apoptosis	(48)
	MIR22HG	Downregulated	YBX1/MET/p21	Suppresses proliferation and invasion	(49)
	MEG3	Downregulated	p53	Cisplatin sensitivity	(50)
	GAS5	Downregulated	P53, E2F1, miR-21	EGFR-TKIs sensitivity	(51)

Gastric	MALAT1	Upregulated	miR-23B-3P/ATG12/miR-30b/ATG5/SOX2	Induces autophagy	(52)
	AK022798	Upregulated	MRP1	Inhibits cell apoptosis	(53)
	CRAL	Upregulated	miR-505/CYLD	Promotes DNA damage and apoptosis	(54)
	ROR	Upregulated	MRP1	Inhibits cell apoptosis	(55)
	XLOC_006753	Upregulated	Vimentin/Snail	Inhibits cell apoptosis/Promots EMT	(56)
	MACC1-AS1	Upregulated	miR-145-5p/CD133/OCT4/SOX2/LIN28	Increases cancer stemness	(57)
	D63785	Upregulated	miR-422a/MEF2D	Inhibits cell apoptosis	(58)
	LINC01433	Upregulated	YAP/USP9X	Inhibits cell apoptosis	(59)
	HOXD-AS1	Upregulated	EZH2/PDCD4	Epigenetically silencing PDCD4 via recruiting EZH2	(60)
	HULC	Upregulated	FOXM1	Suppresses autophagy/Promotes cell apoptosis	(61)
	PCAT-1	Upregulated	miR-128/ZEB1/EZH2	Promotes EMT	(60)
	HOTAIR	Upregulated	miR-17-5p/PTEN/miR-217/miR-34a/miR-126	Promotes EMT and cell proliferation/Inhibitis cell apoptosis	(62)
	THOR	Upregulated	SOX9	Increases cancer stemness	(63)
	BLACAT1	Upregulated	miR-361/ABCB1	Inhibits apoptosis/Promotes invasion	(64)
	GHET1	Upregulated	BAK/BCL-2/MDR1/MRP1	Inhibits cell apoptosis	(65)
	ANRIL	Upregulated	MDR1/MRP1	Regulates MDR-related genes	(66)
	UCA1	Upregulated	PARP/BCL-2/miR-27b	Inhibits cell apoptosis	(67)
	PVT1	Upregulated	BCL-2/MDR1/MRP1	Inhibits cell apoptosis	(68)
	MRUL	Upregulated	ABCB1	Inhibits cell apoptosis	(69)
	SNHG5	Upregulated	BCL-2/BAX/MDR1/MRP1	Inhibits cell apoptosis	(70)
	DANCR	Upregulated	MDR1/MRP1	Inhibits cell apoptosis	(71)
	FAM84B-AS	Upregulated	FAM84B/BCL2/BCL-xL	Inhibits cell apoptosis	(72)
	BCAR4	Upregulated	OCT3/4/SOX2/c-Myc/KLF4	Increases cancer stemness	(70)
	NEAT1	Upregulated	N/A	Inhibits cell apoptosis/Promotes invasion	(73)
	CASC9	Upregulated	MDR1	Inhibits cell apoptosis/Promotes cell proliferation	(74)
	HOTTIP	Upregulated	Vimentin/ZEB1/Twist	Promotes EMT	(75)
	HCP5	Upregulated	MiR-3619-5p/SOX2/OCT4/LIN28/CD1331	Increases cancer stemness	(76)
	CASC2	Downregulated	miR-19a	Promotes cell apoptosis	(77)
	LEIGC	Downregulated	Vimentin/Twist/Slug/ZEB1/Snail	Inhibits EMT	(78)
Thyroid	H19	Upregulated	miR-17-5p/YES1	Promotes proliferation, migration, and invasion	(79)
	HCP5	Upregulated	miR-22-3p/miR-186-5p/miR-216a-5p/ST6GAL2	Promotes proliferation, migration, invasiveness	(80)
	HOTTIP	Upregulated	miR-637	Promotes proliferation, invasion, and migration	(81)
	MALAT1	Upregulated	miR-21	Inhibits cell proliferation and invasion	(82)
	SNHG15	Upregulated	miR-200a-3p	Promotes cell growth and migration	(83)

	SPRY4-IT	Upregulated	TGF-β1/Smad	Promotes proliferation	(84)
	OIP5-AS1	Upregulated	FXR1/YY1/CTNNB1	Promotes cell proliferation and migration	(85)
	Linc00210	Upregulated	miR-195-5p/IGF1R/Akt	Promotes proliferation, migration, and invasion	(86)
	UCA1	Upregulated	UCA1/miR-15a	Promotes cell proliferation	(87)
	CCAT1	Upregulated	miR-143	Promotes cell proliferation, migration, and invasion	(88)
	XIST	Upregulated	miR-34a	Promotes cell proliferation and tumor growth	(89)
	NEAT1	Upregulated	miRNA-214	Promotes cell growth and metastasis	(90)
	NR2F1-AS1	Upregulated	miR-423-5p/SOX12	Promotes proliferation and invasion	(91)
	LINC00152	Upregulated	miR-497/BDNF	Promotes cell growth and invasion	(92)
	MCM3AP-AS1	Upregulated	MCM3AP-AS1/miR-211-5p/ SPARC	Promotes proliferation, migration, and invasion	(93)
	AB074169	Downregulated	CDKN1a	Inhibits cell growth	(94)
	ASMTL-AS1	Downregulated	miR-93-3p/miR-660/FOXO1	Inhibits cell proliferation and glycolysis	(95)
	GAS8-AS1	Downregulated	ATG5	Inhibits proliferation	(96)
	MEG3	Downregulated	miR-182	Inhibits iodine-resistant cell viability/Promotes apoptosis and DNA damage	(97)
	PAR5	Downregulated	EZH2	Inhibits proliferation and migration	(98)
	HOTAIRM1	Downregulated	TDG	Inhibits cell proliferation, invasion, and migration	(99)
	PAPAS	Downregulated	HOTTIP	Inhibits cell proliferation	(100)
Brain	HOXA11-AS	Upregulated	Tpl2-MEK1/2-ERK1/2	Sensitizes glioblastoma cells to ROS, drastically impairing tumor growth and prolonging survival of mouses	(101)
	LINC01018	Upregulated	KNG1	Suppresses the migration, invasion, and proliferation of glioma cells	(102)
	LINC01018	Upregulated	ADRA2C/ RAB6B/RAB27B/ RAPGEF5/STEAP2/TAGLN3/UNC13C	Inhibits cell proliferation and metastasis	(103)
	TUSC7	Upregulated	BDNF/ERK	Suppresses glioma cell proliferation and migration	(104)
	DANCR	Upregulated	DLX6/ATG7	Promotes intracellular autophagy and proliferation and reduce apoptosis	(105)
	LINC01426	Downregulated	Mdm2	Inhibits proliferation and induces apoptosis	(106)
	MIR210HG	Downregulated	LMX1A	Suppresses glioma cell proliferation	(107)
	PDCD4-AS1	Downregulated	METTL7B	Inhibits glioma cell proliferation, invasion, migration, and induces cell cycle arrest	(108)
	GSCAR	Downregulated	SRSF1	Promotes tumor cell responses to TMZ	(109)
	SPRY4-IT1	Downregulated	EZH2/VEGFA	Achieves cell proliferation and angiogenesis	(110)

Liver	ATB	Upregulated	miR-200	Promotes metastasis	(111)
	UFC1	Upregulated	β-catenin/HuR	Promotes proliferation	(112)
	PXN-AS1	Upregulated	PXN	Promotes proliferation	(113)
	ANRIL	Upregulated	EZH2	Promotes proliferation	(114)
	TUG1	Upregulated	EZH2	Promotes proliferation and glycolysis	(115)
	lnc-β-Catm	Upregulated	EZH2/β-catenin	Promotes stemness	(116)
	GIHCG	Upregulated	EZH2	Promotes proliferation and metastasis	(117)
	DANCR	Upregulated	β-catenin	Promotes stemness	(118)
	MALAT1	Upregulated	miR-143-3p	Promotes metastasis and proliferation	(119)
	HULC	Upregulated	miR-186/miR-9	Promotes proliferation and lipogenesis	(120)
	XIST	Upregulated	miR-92b	Inhibits metastasis and proliferation	(121)
	PVT1	Upregulated	NOP2	Promotes stemness	(122)
	HOTTIP	Upregulated	miR-192/miR-204	Promotes glutaminolysis	(123)
	DILC	Upregulated	IL-6	Inhibits stemness	(124)
	ICR	Upregulated	ICAM-1	Promotes stemness	(125)
	ZFAS1	Upregulated	miR-150	Promotes metastasis	(126)
	MVIH	Upregulated	PGK1	Promotes metastasis	(127)
	CASC9	Upregulated	HNRNPL	Promotes proliferation	(128)
	Dreh	Downregulated	Vimentin	Inhibits metastasis and proliferation	(129)
Kidney	HOTAIR	Upregulated	EZH2/miR-141/Ago2	Promotes proliferation, invasion, cell cycle	(130)
	lncRNA-ATB	Upregulated	EMT	Promotes proliferation, apoptosis, migration, invasion	(131)
	MALAT1	Upregulated	Ezh2/miR-205	Promotes proliferation, migration, invasion	(132)
	HEIRCC	Upregulated	EMT	Promotes proliferation, apoptosis, migration, invasion	(133)
	PVT1	Upregulated	MYC	Promotes promoter hypomethylation	(134)
	CADM1-AS1	Downregulated	CADM1	Promotes cell proliferation, apoptosis and migration	(135)
	MEG3	Downregulated	Bcl-2/rocaspase-9/leaved caspase-9/cytochrome c	Promotes apoptosis, mitochondrial pathway	(136)
	BX357664	Downregulated	EMT/MMP2/MMP9/TGF-β1/p38/HSP27	Promotes proliferation, migration, invasion, cell cycle	(137)
	CASC2	Downregulated	miR-21	Promotes proliferation, migration	(138)
Colorectal	ATB	Upregulated	E-cadherin/ZO-1/ZEB1/N-cadherin	Promotes invasion, induces EMT	(139)
	BC200	Upregulated	STAT3/β-catenin	Promotes proliferation, invasion, EMT/Inhibits apoptosis, regulates cell cycle	(140)
	CASC15	Upregulated	miR-4310/LGR5	Promotes proliferation, migration, invasion	(141)
	CCAT1	Upregulated	c-Myc	Promotes proliferation, invasion, drug resistance	(142)

	CCAT2	Upregulated	miR-145	Promotes growth and metastasis	(143)
	CYTOR	Upregulated	β-catenin/TCF complex	Promotes migration, invasion, EMT	(144)
	DMTF1v4	Upregulated	p-ERK/p-JNK/p-p38	Increases proliferation, migration/Inhibits apoptosis	(145)
	ENST00000455974	Upregulated	JAG2	Promotes proliferation and migration	(146)
	FAL1	Upregulated	STAT3/TGF-β1/Bcl-2/p65/PCNA	Promotes proliferation, invasion/Inhibits apoptosis	(147)
	FAM83H-AS1	Upregulated	TGF-β	Promotes tumorigenesis	(148)
	GSEC	Upregulated	DHX36	Promotes migration	(149)
	HNF1A-AS1	Upregulated	miR-34a/p53	Promotes proliferation, migration, invasion	(150)
	HOTAIR	Upregulated	E-cadherin/vimentin/MMP-9	Promotes migration, invasion	(151)
	HULC	Upregulated	miR-613/RTKN/vimentin/N-cadherin/E-cadherin	Promotes proliferation, migration, invasion	(152)
	H19	Upregulated	miR138/HMGA1/miR-675-5p	Promotes invasion, migration, drug resistance	(153)
	Linc01106	Upregulated	miR-449b-5p/Gli	Promotes proliferation, migration, stemness	(154)
	Linc01234	Upregulated	miR-642a-5p/SHMT2	Promotes proliferation	(155)
	Linc01567	Upregulated	miR-93	Promotes proliferation, invasion, migration	(156)
	Linc01578	Upregulated	NF-κB/YY1	Promotes metastasis	(157)
	Linc02418	Upregulated	miR-34b-5p/Bcl-2	Promotes growth, mobility, invasion/Inhibits apoptosis	(158)
	Lnc34a	Upregulated	Dnmt3a/PHB2/HDAC1	Promotes proliferation, stem cells	(159)
	Loc441461	Upregulated	PhoA/ROCK	Promotes growth, motility/Inhibits apoptosis	(160)
	LincDUSP	Upregulated	ATR/p53/E2F/c-Myc	Promotes proliferation, stem cells, modulates DNA damage response and cell cycle/Inhibits apoptosis	(161)
	MALAT1	Upregulated	miR-129-5p/HMGB1/miR-663a	Promotes proliferation, invasion, migration	(162)
	MYU	Upregulated	hnRNP-K/CDK6	Promotes proliferation, controls cell cycle	(163)
	PCAT6	Upregulated	EZH2	Promotes proliferation and apoptosis	(164)
	PVT1	Upregulated	miR-26b/miR-30d-5p/RUNX2	Promotes proliferation, migration, invasion	(165)
	ROR	Upregulated	miR-145	Promotes proliferation, migration, invasion	(166)
	RP11-619 L19.2	Upregulated	miR-1271-5p/CD164	Promotes proliferation, migration, invasion, EMT	(167)
	SBDSP1	Upregulated	p21/cyclin D1	Promotes proliferation, migration, invasion, regulates cell cycle	(168)
	SNHG1	Upregulated	c-Myc/cyclin D	Promotes proliferation, invasion, migration/Inhibits apoptosis	(169)
	SNHG7	Upregulated	miR-193b/K-ras/ERK/cyclinD1	Promotes proliferation/Inhibits apoptosis	(170)
	SNHG15	Upregulated	Slug	Promotes proliferation and migration	(171)
	SNHG17	Upregulated	miR-375/CBX3	Promotes proliferation, migration, invasion	(172)

	TUG1	Upregulated	miR-26a-5p/MMP-14/VEGF/MAPK/Hsp27	Promotes proliferation, migration, invasion, EMT/Inhibits apoptosis,	(173)
	UPAT	Upregulated	UHRF1	Promotes survival	(174)
	USP2-AS1	Upregulated	Phosph-YAP	Promotes proliferation and metastasis	(175)
	XIST	Upregulated	miR-34a/β-catenin cyclin D1/c-Myc/MMP-7	Promotes proliferation	(176)
	ZEB1-AS1	Upregulated	miR-455-3p/PAK2	Promotes proliferation, migration, invasion	(177)
	ZFAS1	Upregulated	ZEB1/E-cadherin/ZO-1/vimentin/N-cadherin	Promotes proliferation, invasion, EMT/Inhibits apoptosis,	(178)
	Pint	Downregulated	PRC2	Inhibits proliferation	(179)
	Loc285194	Downregulated	miR-211	Inhibits proliferation	(180)
	Linc00261	Downregulated	β-catenin	Inhibits proliferation, invasion, migration, drug resistance/Promotes apoptosis	(181)
	Linc00657	Downregulated	CAPN7	Inhibits proliferation, invasion/Promotes apoptosis	(182)
	DACOR1	Downregulated	Cystathionine β-synthase	Inhibits proliferation/Promotes DNA methylation	(183)
	B3GALT5-AS1	Downregulated	miR-203/ZEB2/Snail	Inhibits proliferation/Promotes migration, invasion, EMT	(184)
Prostate	CASC11	Upregulated	YBX1/miR-145	Promotes proliferation/Inhibits miR-145	(185)
	SNHG17	Upregulated	TCF1/TCF4/LEF1/c-myc/cyclin D1/axin2	Promotes proliferation/Inhibits apoptosis	(186)
	SNHG16	Upregulated	miR-373-3p	Promotes proliferation and migration	(187)
	SNHG14	Upregulated	miR-5590-3p/YY1/Cyclin D1/Bcl-2/N cadherin/Bax/Caspase-3/E cadherin	Promotes proliferation and invasion	(188)
	SNHG12	Upregulated	CCNE1/miR-195	Promotes apoptosis and autophagy	(189)
	SNHG11	Upregulated	miR-184	Promotes progression	(190)
	SNHG8	Upregulated	miR-384/HOXB7	Promotes proliferation, migration and invasion	(191)
	SNHG7	Upregulated	c-Myc	Inhibits proliferation and glycolysis	(192)
	SNHG3	Upregulated	miR-152-3p/miR-214-3p	Promotes proliferation, invasion, and migration/Inhibits metastasis	(193)
	SNHG1	Upregulated	EZH2	Promotes proliferation, apoptosis, migration, invasion	(194)
	lncHUPC1	Upregulated	FOXA1/SDCCAG3/miR-133b	Promotes metastasis and growth	(195)

	MNX1-AS1	Upregulated	miR-2113	Promotes proliferation, migration and invasion	(196)
	CERS6-AS1	Upregulated	miR-16-5p	Inhibits proliferation and migration	(197)
	DANCR	Upregulated	miR-33b-5p	Promotes proliferation, migration, and taxol resistance	(198)
	MALAT1	Upregulated	MYBL2	Inhibits p-mTOR	(199)
	PCGEM1	Upregulated	miR-129-5p	Promotes progression	(200)
	NEAT1	Upregulated	LDHA/miR-766-5p	Promotes progression	(201)
	DLEU2	Upregulated	miR-582-5p	Promotes proliferation invasion, and migration	(202)
	EIF3J-AS1	Upregulated	MAFG	Promotes progression	(203)
	HOXA-AS2	Upregulated	miR-509-3p/PBX3	Inhibits proliferation and migration	(204)
	LncAY927529	Upregulated	CXCL14	Promotes proliferation and invasion	(205)
	HCG18	Upregulated	miR-370-3p	Promotes cell proliferation, invasion, and migration	(206)
	LINC00893	Downregulated	miR-3173-5p	Tumor suppressor	(207)
	MIR22HG	Downregulated	miR-9-3p	Inhibits cell proliferation/Promotes apoptosis	(208)
	MAGI2-AS3	Downregulated	miR-424-5p/COP1	Inhibits cell proliferation	(209)
	ADAMTS9-AS1	Downregulated	miR-142-5p	Inhibits progression	(210)
	GAS5	Downregulated	miR-320a/RAB21	Inhibits viability and migration	(211)
	EMX2OS	Downregulated	FUS/TCF12	Inhibits tumor growth	(212)
	Erbb4-IR	Downregulated	miR-21	Promotes proliferation and apoptosis	(213)
	FER1L4	Downregulated	FBXW7/miR-92a-3p	Inhibits cell proliferation/Promotes cell apoptosis	(212)
	BLACAT1	Downregulated	DNMT1/HDAC1/ EZH2/MDM2/miR-361	Inhibits cells growth/Promotes cell death	(214)
	LINC00908	Downregulated	miR-483-5p/TSPYL5	Inhibits progression.	(215)
	DGCR5	Downregulated	TGF-b1	Inhibits cells stemness	(216)
	MAGI2-AS3	Downregulated	miR-142-3p	Inhibits proliferation, migration, and invasion	(217)
Bladder	UCA1	Upregulated	CDKN2B/EP300/TGFβ-2	Proliferation, migration, invasion, cell cycle, apoptosis, glycolysis, mitochondria and cisplatin resistance	(218)
	H19	Upregulated	miR-29b-3p/DNMT3B/miR-675/p53	Proliferation, migration, invasion, cell cycle and apoptosis	(219)

	Lnc-MUC20-9	Upregulated	ROCK1	Proliferation, migration, invasion and apoptosis	(220)
	LncARSR	Upregulated	miR-129-5p/SOX4	Proliferation, migration, invasion and EMT	(221)
	lncRNA ROR	Upregulated	ZEB1	Proliferation, migration, apoptosis and cell cycle	(222)
	AWPPH	Upregulated	EZH2/SMAD4	Proliferation, migration and invasion	(223)
	LSINCT5	Upregulated	NCYM	Migration and invasion	(224)
	AATBC	Upregulated	cyclinD1/CDK4/p18/Rb	Proliferation, cell cycle and apoptosis	(225)
	DUXAP8	Upregulated	PTEN	Proliferation	(226)
	SOX2OT	Upregulated	SOX2	Proliferation and apoptosis	(227)
	OXCT1-AS1	Upregulated	miR-455-5p/JAK1	Proliferation, migration and stemness	(228)
	XIST	Upregulated	TET1/p53	Proliferation, migration and apoptosis	(229)
	CASC8	Upregulated	FGFR1/LDHA	Proliferation and invasion	(230)
	LINC01638	Upregulated	ROCK2	Proliferation and glycolysis	(231)
	LNMAT1	Upregulated	hnRNPL/CCL2	EMT	(232)
	LNMAT2	Upregulated	hnRNPA2B1/PROX1	Lymphatic metastasis	(233)
	MST1P2	Upregulated	miR-133b/Sirt1/p53	Prognostic factor	(234)
	MIR503HG	Downregulated	ZEB1/Snail/N-cadherin/vimentin/E-cadherin	Proliferation, migration, invasion, cell cycle and apoptosis	(235)
	MEG3	Downregulated	miR-96/TPM1/miR-494/PTEN/LC3-I/II/miR-27a/PHLPP2	Proliferation, migration, invasion, cell cycle, apoptosis and autophagy	(236)
	lncRNA miR143HG	Downregulated	miR-1275/AXIN2	Proliferation, migration, apoptosis and cell cycle	(237)
	CASC2	Downregulated	β-catenin	Proliferation, migration, invasion and apoptosis	(238)
	PTENP1	Downregulated	miR-17/PTEN	Proliferation, migration, invasion and apoptosis	(239)
	LINC00312	Downregulated	miR-197-3p/MMP2/9/TIMP2	Proliferation, migration and invasion	(240)
	LINC00641	Downregulated	miR-197-3p/KLF10/PTEN/PI3K	Proliferation, migration and invasion	(241)
	LOC572558	Downregulated	MDM2/p53	Proliferation, migration and cell cycle	(242)
	NBAT1	Downregulated	miR-21/SOCS6	Proliferation, migration and cell cycle	(243)
	MT1JP	Downregulated	miR-214-3p	Proliferation, invasion and cell cycle	(244)
	DGCR5	Downregulated	ARID1A/P21	Proliferation and cell cycle	(245)
	GAS5	Downregulated	CCL1/Bcl2/CDK6	Proliferation and apoptosis	(246)
	MBNL1-AS1	Downregulated	miR-135a/PHLPP2/FOXO1	Proliferation and apoptosis	(247)
	TP73-AS1	Downregulated	Vimentin/MMP-2/9/snail/E-cadherin	Proliferation	(248)
	lncRNA-LBCS	Downregulated	hnRNPK/EZH2/SOX2/H3K27	Proliferation	(249)
Cervical	HOTAIR	Upregulated	miR-143-3p/miR-23b/miR-17-5p/MAPK1/BCL-2	Cell growth, proliferation, survival, EMT metastasis and invasion	(250)
	H19	Upregulated	miR-106/miR-194/miR-138-5p/miR-675/miR-140/miR-200/MILK	Cell migration and proliferation	(251)
	MALAT1	Upregulated	miR-145	Cell migration, proliferation, vascular invasion, EMT and metastasis	(252)

	CCHE1	Upregulated	PCNA	Cell proliferation and metastasis	(253)
	ANRIL	Upregulated	miR-186	Cell proliferation and metastasis	(254)
	BLACAT1	Upregulated	miR-143/miR-424	Cell proliferation and migration	(255)
	XIST	Upregulated	miR-140-5p	Cell proliferation, invasion, EMT and migration	(256)
	SPRY4-IT1	Upregulated	miR-101-3p/ZEB1	Cell proliferation and migration	(257)
	DLX6-AS1	Upregulated	miR-16-5p/miR-199a/ARPP19/FUS	Cell proliferation and invasion	(258)
	HOXD-AS1	Upregulated	miR-130a-3p/ZEB1	Cell growth, migration and invasion	(259)
	CRNDE	Upregulated	miR-183/CCNB1/PUMA/P53	Cell proliferation and apoptosis	(260)
	PVT1	Upregulated	Smad3/miR-140-5p/miR-424/miR-195/miR-200b/EZH2/TGF-β1	Cell growth, proliferation and metastasis	(261)
	MEG3	Downregulated	miR-21-5p/BCL-2/Bax/P21/P-STAT3	Metastasis and apoptosis	(262)
	GAS5	Downregulated	miR-196a/miR-205	Cell proliferation, invasion and apoptosis	(263)
Ovarian	LncRNA-ATB	Upregulated	miR-204-3p/NID1	Promotes invasion and tumorigenesis	(264)
	CASC9	Upregulated	miR-758-3p/LIN7A	Promotes proliferation, migration and invasion	(265)
	CCAT1	Upregulated	miR-152/ADAM17/miR-130b/STAT3/ZEB1	Promotes migration, invasion and metastasis	(266)
	CCAT2	Upregulated	miR-424	Promotes proliferation and progression	(267)
	CDKN2B-AS1	Upregulated	miR-411-3p/HIF1A	Promotes migration, invasion and metastasis	(268)
	DANCR	Upregulated	miR-145/VEGF	Promotes invasion	(269)
	DLEU1	Upregulated	miR-490-3p/CDK1	Promotes migration and invasion	(270)
	DLX6-AS1	Upregulated	miR-195-5p/FHL2	Promotes migration, invasion and EMT	(271)
	DQ786243	Upregulated	miR-506/CREB1	Promotes migration, invasion and EMT	(272)
	EMX2OS	Upregulated	miR-654/AKT3	Promotes invasion	(273)
	FLVCR1-AS1	Upregulated	miR-513/YAP1	Promotes migration, invasion and EMT	(274)
	GIHCG	Upregulated	miR-429	Promotes cell cycle	(275)
	H19	Upregulated	miR-370-3p	Promotes TGF-β-induced EMT	(276)
	HAGLROS	Upregulated	miR-100/ZNRF2	Poor prognosis	(277)
	CREB1-HAS2-AS1	Upregulated	miR-466/RUNX2	Promotes invasion and tumor growth	(278)
	HOST2	Upregulated	let-7b	Promotes migration, invasion and metastasis	(279)
	HOTAIR	Upregulated	miR-1/miR-214-3p/miR-330-5p/MAPK1/miR-214/miR-217/PIK3R3	Promotes proliferation, migration and invasion	(280)
	HOXD-AS1	Upregulated	miR-608/FZD4	Promotes migration and invasion	(281)
	HULC	Upregulated	miR-125a-3p	Promotes migration and invasion	(282)
	KCNQ1OT1	Upregulated	miR-212-3p/LCN2/miR-142-5p/CAPN10	Promotes migration and invasion	(283)
	LEF1-AS1	Upregulated	miR-1285-3p	Promotes migration, invasion and metastasis	(284)
	LINC00152	Upregulated	miR-125b/MCL-1	Poor prognosis	(285)
	LINC00161	Upregulated	miR-128/MAPK1	Drug resistance	(286)
	LINC00319	Upregulated	miR-423-5p/NACC1	Promotes proliferation, migration and invasion	(287)
	LINC00339	Upregulated	miR-148a-3p/ROCK1	Promotes migration and invasion	(288)

	LINC00460	Upregulated	miR-338-3p	Promotes migration, invasion and metastasis	(289)
	ESR1-LINC00511	Upregulated	miR-424/miR-370	Promotes proliferation and invasion	(290)
	LINC00963	Upregulated	miR-378/CHI3L1	Promotes migration	(291)
	LINC01118	Upregulated	miR-134/ABCC1	Promotes migration and invasion	(292)
	LUCAT1	Upregulated	miR-612/HOXA13	Promotes metastasis	(293)
	MALAT1	Upregulated	miR-506/miR-200c/miR-143-3p/CMPK/miR-211/PHF19/miR-503-5p	Promotes proliferation, migration, invasion and metastasis	(294)
	MLK7-AS1	Upregulated	miR-375/YAP1	Promotes invasion and metastasis	(295)
	MIR4435-2HG	Upregulated	miR-128-3p/CDK14	Promotes migration and invasion	(296)
	NCK1-AS1	Upregulated	miR-137/NCK1	Promotes migration and invasion	(297)
	Hur>NEAT1	Upregulated	miR-124-3p	Promotes migration, invasion and metastasis	(298)
	NEAT1	Upregulated	miR-382-3p/ROCK1/miR-770-5p/PARP1	Promotes migration, invasion and metastasis	(299)
	LIN28B>NEAT1	Upregulated	miR-506	Promotes migration and invasion	(300)
	NORAD	Upregulated	miR-199a-3p	Promotes proliferation, migration and invasion	(301)
	Lnc-OC1	Upregulated	miR-34a, miR-34c	Promotes migration and invasion	(302)
	OIP5-AS1	Upregulated	miR-137/ZNF217	Promotes migration and invasion	(303)
	PCAT-1	Upregulated	miR-129-5p	Promotes proliferation/Inhibits apoptosis	(304)
	PTAF(LINC00922)	Upregulated	miR-25/SNAI2	Promotes invasion and metastasis	(305)
	PTAR (AP000695.4)	Upregulated	miR-101/ZEB1	Promotes migration and metastasis	(306)
	PTAL	Upregulated	miR-101/FN1	Promotes invasion and metastasis	(307)
	PVT1	Upregulated	miR-133a/miR-214/FOXO4/miR-140	Promotes proliferation, migration and invasion	(308)
	RHPN1-AS1	Upregulated	miR-1299	Promotes migration and invasion	(309)
	LncRNA-ROR	Upregulated	miR-145/FLNB	Promotes migration and invasion	(310)
	SCAMP1	Upregulated	miR-137/CXCL12	Promotes invasion	(311)
	SNHG12	Upregulated	miR-129/SOX4	Promotes migration and metastasis	(312)
	TDRG1	Upregulated	miR-93/RhoC	Promotes migration and invasion	(313)
	TMPO-AS1	Upregulated	miR-200c/TMEFF2	Promotes invasion	(314)
	TTN-AS1	Upregulated	miR-15b-5p/FBXW7	Inhibits proliferation/Promotes apoptosis	(315)
	TUG1	Upregulated	miR-29b-3p/MDM2	Promotes migration and invasion	(316)
	UCA1	Upregulated	miR-129/ABCB1	Promotes proliferation, migration and invasion	(317)
	ZFAS1	Upregulated	miR-150-5p/Sp1	Promotes proliferation and migration	(318)
	ADAMTS9-AS2	Downregulated	miR-182-5p/FOXF2	Inhibits invasion and EMT	(319)
	EPB41L4A-AS2	Downregulated	miR-103a/RUNX1T1	Inhibits migration and invasion	(320)
	GAS5	Downregulated	miR-21/SPRY2/miR-196a-5p/HOXA5	Inhibits proliferation, migration and invasion	(321)
	HAND2-AS1	Downregulated	miR-340-5p/BCL2L11	Inhibits migration and invasion	(322)
	HOTAIRM1	Downregulated	miR-106a-5p/ARHGAP24	Inhibits migration, invasion and metastasis	(323)
	LINC01088	Downregulated	miR-24-1-5p/PAK4	Inhibits proliferation	(324)

	LINC01125	Downregulated	miR-1972	Inhibits proliferation/Promotes cisplatin sensitivity	(325)
	LINC01133	Downregulated	miR-205/LRRK2	Inhibits invasion and migration	(326)
	MAGI2-AS3	Downregulated	miR-525-5p/MXD1/miR-15-5p/PTEN	Inhibits cell cycle, migration and invasion	(327)
	MIR503HG	Downregulated	miR-31-5p	Inhibits invasion and migration	(328)
	MORT	Downregulated	miR-21	Inhibits proliferation	(329)
	WDFY3-AS2	Downregulated	miR-18a/RORA	Inhibits migration, invasion and EMT	(330)
Pancreatic	C9orf139	Upregulated	miR-663a/Sox12	Poor clinicopathological feature	(331)
	CRNDE	Upregulated	miR-384	Oncogene	(332)
	HOTAIR	Upregulated	miR-34a	Promotes proliferation and invasion	(333)
	HOTTIP	Upregulated	HOXA10/HOXB2/ HOXA11/HOXA9/HOXA1	Promotes proliferation, apoptosis and migration	(334)
	HOXA-AS2	Upregulated	EZH2/LSD1	Oncogene	(335)
	L INC 00976	Upregulated	miR-137/OTUD7B	Promotes invasion, migration and proliferation	(336)
	LINC00462	Upregulated	miR-665/TGFBR1/TGFBR2	Promotes EMT and cell proliferation/Inhibits cell apoptosis	(337)
	LINC01559	Upregulated	miR-1343-3p/RAF1	Promotes proliferation and metastasis	(338)
	LINC00152	Upregulated	miR-150	Promotes cells progressions	(339)
	LINC00958	Upregulated	miR-330-5p	Promotes EMT process and metastasis	(340)
	LUCAT1	Upregulated	miR-539	Promotes invasion	(341)
	LINC00994	Upregulated	miR-765-3p/RUNX2	Oncogene	(342)
	LINC01207	Upregulated	miR-143-5p	Promotes apoptosis and autophagy activity	(343)
	MACC1-AS1	Upregulated	PAX8	Promotes proliferation and metastasis	(344)
	OIP5-AS1	Upregulated	miR-429/FOXD1	Promotes EMT process, invasion and proliferation	(345)
	PVT1	Upregulated	miR-519d-3p	Promotes progression	(346)
	SBF2-AS1	Upregulated	miR-122-5p	Oncogene	(347)
	SNHG7	Upregulated	miR-146b-5/Robo1	Promotes progression	(348)
	SNHG12	Upregulated	miR-320b	Promotes invasion, EMT and proliferation	(349)
	SNHG14	Upregulated	miR-613	Promotes progression	(350)
	SNHG15	Upregulated	zeste homolog 2	Oncogene	(351)
	SPRY4-IT1	Upregulated	Cdc20	Promotes progression	(352)
	TP73 -AS1	Upregulated	miR-141	Promotes migration, invasion and proliferation	(353)
	UCA1	Upregulated	miR-96/FOXO3	Oncogene	(354)
	XIST	Upregulated	miR-133a/EGFR	Promotes proliferation	(355)
	ZEB2-AS1	Upregulated	miR-204/HMGB1	Promotes proliferation and invasion	(356)
	ENST00000480739	Downregulated	OS-9	Inhibits tumor metastasis and progression	(357)
	LINC01111	Downregulated	miR-3924	Tumor-suppressor	(358)
	LINC01963	Downregulated	miR-641/TMEFF2	Inhibits progression	(359)

	DGCR5	Downregulated	miR-27a-3p/BNIP3	Promotes apoptosis	(360)
	MEG3	Downregulated	PI3K protein	Tumor-suppressor	(361)
	GAS5	Downregulated	miR-32-5p	Tumor-suppressor	(362)
	LINC00261	Downregulated	miR-23a-3p	Promotes progression	(363)

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