Supplementary table 1. Localization, function, targets and related pathologies of metaboLncs

LncRNA	Nuclear/mitochondrial encoded	LncRNA function	Mechanism of action	Main cellular localization	Main target	Pathway	Function	Tissue	Model	Pathology	Reference
Plnc1	nuclear	Chromatin modification	Promotes adipocyte differentiation	nuclear	PPARγ-2	Adipogenesis	*Plnc1* inhibits methylation of CpG region in the promotor region of *PPARγ2* and thereby upregulates transcriptional activity of the *PPARγ2* gene	Adipose tissue	ob/ob mice	Obesity	127
uc.417	nuclear	Chromatin modification	Impairs adipogenesis	nuclear	p38 / Mapk	Adipogenesis	Inhibits phosphorylation of *p38 MAPK* which is essential for activating BAT	Adipose tissue	Cold stimulated mice	Obesity	146
lncBATE10	nuclear	Decoy	Promotes full brown fat differentiation	nuclear and cytoplasmic	Celf1	Adipogenesis	*lncBATE10* decoys *Celf1* and thereby prevents repression of PGC1α promoting to brown fat differentiation	Adipose tissue	Browning-treated mice	Obesity	145
Hoxa11-as	nuclear	Induces transcription	Promotes adipogenesis	unknown	C/EBP-α	Adipogenesis	Promotes lipid accumulation in hADSCs	Adipose tissue	Human primary ADSCs	Obesity	133
AC092159.2	nuclear	Induces transcription	Promotes adipogenesis	unknown	TMEM18	Adipogenesis	Activates transcription of *TMEM18* and thereby promotes adipocyte differentiation	Adipose tissue	Human visceral pre-adipocytes	Obesity	134
Sra1	nuclear	Induces transcription of PPARγ-dependent gene expression	Promotes adipocyte differentiation	unknown	PPARγ	Adipogenesis	Enhances *PPARγ* expression and promotes glucose uptake	Adipose tissue	Mice fed with HFD	T2D, obesity	86
Paral1	nuclear	Induces transcription of PPARγ-dependent gene expression	Promotes adipogenesis	nuclear	RBM12/CoAA/PPARγ	Adipogenesis	Coactivates *PPARγ* and thereby regulates adipogenesis	Adipose tissue	ob/ob mice, human WAT	Obesity	131
lnc-U90926	nuclear	Inhibits transcription	Inhibits adipogenesis	cytoplasmic	PPARγ, FABP4, adiponectin	Adipogenesis	Supresses *PPARγ* in adipocytes and thereby inhibits 3T3-L1 differentiation	Adipose tissue	ob/ob mice	Obesity	137
PU.1as	nuclear	Inhibits translation	Inhibits adipogenesis	unknown	PU.1	Adipogenesis	Inhibits translation of *PU.1* gene by forming a duplex	Adipose tissue	Mouse AT / 3T3-L1 cells	Hyperlipidemia, IR, T2D	130
AdipoQ-AS	nuclear	Inhibits translation	Inhibits adipogenesis	nuclear and cytoplasmic	Adiponectin	Adipogenesis	Inhibits adipogenesis by forming RNA duplexes	Adipose tissue, liver	Mice fed with HFD	Obesity	136
Tincr	nuclear	miRNA sponging/ceRNA	Promotes adipocyte differentiation	cytoplasmic	miR-31	Adipogenesis	Suppress expression of *miR-31* which enhances adipocyte differentiation in human adipose tissue-derived mesenchymal stem cells (hADSCs)	Adipose tissue	Human primary ADSCs	Obesity	128
TCONS_00041960	nuclear	miRNA sponging/ceRNA	Inhibits adipogenesis	unknown	miR-204-5p/miR-125a-3p	Adipogenesis	Supresses adipogenesis by forming a complex with *miR-125a-3p* leading to *PPARγ* inhibition	Bone marrow	Rat bone marrow mesenchymal stem cells	Osteogenic differentiation	135
lncBATE1	nuclear	Protein binding	Promotes formation and maintenance of brown adipocytes capable of thermogenesis	nuclear and cytoplasmic	hnRNP U	Adipogenesis	*lncBATE1* reduces BAT-selective gene expression in primary brown adipocytes through an interaction with hnRNPU	Adipose tissue	Mouse pre-adipocytes	Obesity	144
Lexis	nuclear	Enhancer	Inhibits cholesterol biosynthesis	nuclear	Ribonucleoprotein Raly	Cholesterol metabolism	Reduces hepatic and serum cholesterol levels via LXR signaling	Liver, serum	High fat and cholesterol diet fed mice	Atherosclerosis	110
Chrome	nuclear	MiRNA interaction	Promotes cholesterol efflux	cytoplasmic	miR-27b, miR-33a, miR-33b and miR-128	Cholesterol metabolism	Promting cholesterol efflux and HDL biogenesis via inhibiting miRNAs important in these pathways	Liver, plasma	High fat diet fed macaque / human primary hepatocytes	Atherosclerosis, CAD	116
ARSR	nuclear	Unknown	Promotes cholesterol biosynthesis	Unknown	Akt/SREBF-2/HMGCR	Cholesterol metabolism	Promotes hepatic cholesterol biosynthesis via regulating the expression of HMG-CoA	Liver	High cholesterol diet fed mice	NAFLD, NASH	100, 101
Neat1	nuclear	Unknown	promotes adipogenesis	nuclear	miR-342-3p	Cholesterol metabolism	*NEAT1* interacts with *miR-342-3p* and downregulation of *NEAT1* inhibited *CD36* mRNA expression and decreased total cholesterol and triglyceride content via *miR-342-3p*	THP-1 macrophages	THP-1 cells	Atherosclerosis	122
lnc-HC	nuclear	Unknown	Inhibits cholesterol metabolism	unknown	SREBP-1c/PPARγ/miR-130b-ep	Cholesterol metabolism, triglyceride metabolism	Negative regulation of hepatic cholesterol and triglyceride metabolism	Liver	High fat and cholesterol diet fed mice	Lipid disorders and NAFLD	113
lncLGR	nuclear	Binding to repressor	Supresses glucokinase activity	nuclear	Ribonucleoprotein L	Glucose metabolism	*lncLGR* negatively regulates GCK expression and glycogen deposition	Liver	Fasted mice	Fasting	84
Meg3	nuclear	ceRNA	Promotes insulin production	nuclear	miRNA-214/EZH2	Glucose metabolism	Inhibition of transcription factors inhibiting insulin production	Blood, liver, pancreas	Obese mice, diabetic mice	T2D	76-80
Pluto	nuclear	Chromatin modification	Regulates β-cell development	nuclear	PDX1	Glucose metabolism	Regulate β-cell development by regulating transcription of *PDX1* via promoting interaction between *PDX1* and its upstream enhancer cluster	Pancreas	Human β-cells	T2D	68
Uc.322	nuclear	Induce transcription	Promotes insulin secretion	unknown	PDX1/FOXO1	Glucose metabolism	Increase insulin transcription factors *PDX1* and *FOXO1* in pancreatic β-cells	Pancreas	Mouse β-cells	T2D	82
Miat	nuclear	MiRNA sponging	Promotes insulin resistance	nuclear	miR-139	Glucose metabolism	*Miat* acts as a sponge for *miR-139* which is a repressor of *FOXO1* , an important player in glyconeogenesis	Liver	Obese mice	T2D, obesity	83
Nonratt021972	nuclear	Unknown	Interacts with phospho-Akt	unknown	p-AKT	Glucose metabolism	Negative regulation of *p-AKT* and *GK* expression	Liver	Diabetic rats	T2D	85
Dreh	nuclear	Unknown	KD impairs glucose metabolism	unknown	GLUT4	Glucose metabolism	Regulation of glucose transport via *GLUT4* expression	Skeletal muscle	Mouse myotubes	T2D	89
Tug1	nuclear	Unknown	Mediates glucose metabolism	unknown	PDX1/GLUT2	Glucose metabolism	Knockdown of *TUG1* induces apoptosis of and decreases insulin secretion in β-cells in vitro and in vivo	Pancreas	NOD mice	T2D	81
H19	nuclear	MiRNA sponging	Promotes β-cell development	cytoplasmic	Let-7	Glucose metabolism	Let-7 inhibition leading to Akt activation	Pancreas	Islets of newborn and adult rats	Diabetes	69
H19	nuclear	Decoy/inhibit transcription	Improves glucose metabolism	nuclear	p53	Glucose metabolism	Decoy p53 from FoxO1 promoter leading to reduced FoxO1 and gluconeogenic gene transcription	Liver	Hep2G cells, H19 silencing in mice	Diabetes	70
H19	nuclear	MiRNA sponging	Improves insulin sensitivity	cytoplasmic	Let-7	Glucose metabolism	Let-7 inhibition leading to derepression of the expression of let-7 target genes, therefore improving insulin sensitivity	Skeletal muscle	Insulin resistant mice, patients with diabetes	Diabetes	72
MALAT1	nuclear	Unknown	Induces capillary degeneration, microvascular leakage, and retinal inflammation	nuclear	p38/MAPK	Glucose metabolism	Induce activation of p38/MAPK	Retina	STZ-induced diabetic rats and db/db mice	Diabetes	93, 94
Anril	nuclear	Scaffold	Regulation of glucose and fatty acid metabolism	nuclear	PRC2/ADIPOR1/TMEM258/VAMP3	Glucose metabolism, fatty acid metablism	Regulation of a variaty of genes involved in glucose and fatty acid metabolism		H293T cells	MI, CAD	95,96

Gas5	nuclear	Riborepressor/ Inhibits transcription	Promotes wound healing and negative regulation of cholesterol efflux	nuclear	TAF15/Abca1	Glucose metabolism, lipid efflux	Decreased levels of *GAS5* are asscociated with increased risk of T2D and promotes wound healing in diabetic foot ulcers. Also associated with *ABCA1* downregulation by binding to *EZH2*	Serum	HUVECS / diabetic foot ulcers mice/ ApoE-/- mice	T2D,DFU, hyperglycemia, CAD	90-92
slincRAD	nuclear	Unknown	KD impairs adipocyte development	unknown	Unknown	Glucose metabolism, lipid metabolism, adipogenesis	Downregulation impairs adipocyte development and abnormal glucose and lipid metabolism	Adipose tissue	Mice	Obesity	88
Mexis	nuclear	Enhancer	Promotes cholesterol efflux	unknown	Abca1	Lipid efflux	Induction of *ABCA1* in macrophages	Bone marrow	LXR KO mice	Atherosclerosis, CAD	114
APOA1-AS	nuclear	Inhibits transcription	Negative regulation of HDL biosynthesis	nuclear	ApoA1	Lipid efflux	*APOA1-AS* is a negative transcriptional regulator of *APOA1* , the major component of HDL	Liver	HepG2 cells/African Green Monkeys	Atherosclerosis	119
Dynlrb2-2	nuclear	Unknown	Promotes cholesterol efflux	unknown	Abca1/GPR119	Lipid efflux	Induced by Ox-LDL and leads to increased ABCA1-mediated cholesterol efflux	THP-1 macrophages	ApoE-/- mice	Atherosclerosis	115
AC096664.3	nuclear	Unknown	Mediates LDL-induced cholesterol accumulation	unknown	PPARγ/Abcg1	Lipid efflux	Mediates LDL-induces cholesterol accumulation via *PPARγ* and ABCG1	VSMC	VSMC/THP-1/HUVEC cells	Atherosclerosis	117
H19	nuclear	Induce transcription, regulation of mRNA stability	Induces high-fat and high-sucrose diet-induced steatosis	nuclear	PTBP1	Lipid metabolism	Interacts with PTBP1 to facilitate its association with SREBP1c mRNA and protein, leading to increased stability and nuclear transcriptional activity.	Liver	Primary hepatocytes, H19 KO mice	NAFLD	105
H19	nuclear	MiRNA sponging	Attenuate high-fat diet induced myocardial injury	cytoplasmic	miR-29a	Lipid metabolism	miR-29a inhibition leading to derepression of IGF-1	Heart	Mouse model of obesity, palmitic acid-treated cardiomyocyte cell line	Obesity	106
H19	nuclear	Chromatin modification	BAT differentiation, protects against diet-induced obesity and improves insulin sensitivity and mitochondrial biogenesis	nuclear	MBD1	Lipid metabolism	Recruit MBD1 to affect histone 3 lysine methyltransferases dependent deposition of repressive H3K27 trimethylation marks	BAT	H19 KO and transgenic mice fed with HFD	Obesity	141
MALAT1	nuclear	Regulation of protein stability	Promoted hepatic steatosis and insulin resistance	Nuclear	SREBP-1c	Lipid metabolism	Forms complex with SREBP1c, inhibiting its ubiquitination, thereby increasing the stability of the nuclear SREBP1c protein	Liver	HepG2 cells, ob/ob mice	Steatosis	103
BM450697	nuclear	Inhibits transcription	Control LDL uptake	nuclear and cytoplasmic	LDLR/SREBP1a	lipid metabolism	Inhibit interaction of RNA pol II with *LDLR* promotor region leading to decreased *LDLR* mRNA levels	Liver	HepG2 cells/ primary hepatocytes	Familial hypercholestrolemia	121
Plscr4	nuclear	MiRNA sponging	Promotes MFN2 expression	unknown	miR-214	Mitochondrial fission and fusion	*Plscr4* represses *miR-2114*, which is a repressor of *MFN2* and protects against angiotensin II-induced mitochondrial dysfunction	Heart	Mouse CM, TAC mice	Hypertrophy	124
CARL	nuclear	MiRNA sponging	Inhibits mitochondrial fission	nuclear and cytoplasmic	PHB2	Mitochondrial fission and fusion	*CARL* inhibits expression of *miR-539* and supresses mitochondrial fission via *PHB2* which is a downstream target of *miR-539*	Heart	Mouse CM, I/R injury mice	Cardiotoxicity	153
Cmdl-1	nuclear	Phosphorylation	Inhibits mitochondrial fission	cytoplasmic	DRP1	Mitochondrial fission and fusion	Regulating Drp1 phosphorylation and thereby prevent mitochondrial fission	Heart	H9c2 cells	Cardiotoxicity after DOX treatment	154
Cerox-1	nuclear	MiRNA sponging	Promotes mitochondrial respiration	cytoplasmic	miR-488-3p	Mitochondrial respiratory chain capacity	Post transcriptional regulator of complex I activity via binding to miR-488-3p which promotes regulation of multiple electron transport chain proteins	Heart	N2A cells, HEK293T cells		119
Caren	nuclear	Unknown	Impairs mitochondrial respiration	cytoplasmic	Hint1	Mitochondrial respiratory chain capacity	Impairs mitochondrial respiration in CM by suppressing Hint1 mRNA	Heart	Mouse CM, TAC mice	Heart failure	155
AsnmctRNA-2	mitochondrial	Unknown	Promotes senescence	unknown	hsa-miR-4485/hsa-miR-1973	Senescence	Participating in cell cycle arrest leading to senescence	Aorta	Aged mice/HUVECS	Aging	157
Lipcar	mitochondrial	Unknown	Upregulates TGF-β pathway	unknown	TGF-β/Smad	TGF-β pathway	Upregulated TGF-β and Smad pathways in fibroblast	Heart	Human atrial fibroblasts	Atrial fibrillation	162
B4-GALT1-AS1/lncSHGL	nuclear	Enhancer	Reduces triglyceride content	unknown	hnRNPA1/CALM	Triglyceride metabolism	Activates of PI3K/Akt pathway and inhibition of mTOR/SREBP1c	Liver	Obese mice/ NAFLD mice	Obesity, NAFLD, T2D	158-160
lncLSTR	nuclear	Enhancer	Maintain lipid homeostasis	nuclear	TDP-43	Triglyceride metabolism	lncLSTR depletion enhances apoC2, leading to activation of lipoprotein lipase and increased plasma triglyceride clearance	Liver, plasma	ApoE-/- mice	Hyperlipidemia	112
APOA4-AS	nuclear	mRNA stability	Positively regulates serum triglyceride content	cytoplasmic	HuR/APOA4	Triglyceride metabolism	Binds to HuR and stabilizes APOA4 mRNA	Liver, serum	ob/ob mice/ human liver	Fatty liver disease, obesity	120
lncHR1	nuclear	Unknown	Reduces triglyceride synthesis	cytoplasmic	SREBP-1c	Triglyceride metabolism	Supresses SREPB-1c expression and triglyceride synthesis and thereby affecting lipid metabolism in liver	Liver	Mice fed with HFD		109
Blnc1	nuclear	Scaffold	Increases triglyceride synthesis	nuclear	EDF1	Triglyceride metabolism, adipogenesis	Required for LXR-meidated lipogenic activity in hepatocytes and plays a role in brown to beige adipocyte differentiation	Liver, BAT	Mice fed with HFD/ obese mice	Obesity, NAFLD, T2D	102, 142