**Supplement Table S1**
**Adipogenesis and development-related lncRNAs**

| LncRNA | Tissue | Function | Mechanism of action | Species | Subcellular location | Year | Reference |
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| NEAT1 | White adipose tissue | Promote adipogenic differentiation | Combine with SR (serine/arginine rich) protein to increase the phosphorylation level of Clk kinase and regulate the variable cleavage of PPARγ pre-mRNA | Human | nucleus | 2014 | [121] |
| HOTAIR | White adipose tissue | Promote adipogenic differentiation | Promote the expression of adipogenic differentiation marker genes such as LPL and PPARγ; and up-regulate the expression of FABP4 and ADPN protein | Human | nucleus | 2014 | [136] |
| NEAT1 | ADSCs | Promote adipogenic differentiation | miR-140 enters the nucleus and binds to NEAT1, enhancing the structural stability of NEAT1 and promoting the expression of lipogenic marker genes | Human | nucleus | 2015 | — |

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| ADINR | White adipose tissue | Promote adipogenic differentiation | Change the level of histone modification of C/EBPa | Human | nucleus | 2015 | [91] |
| MEG3 | ADSCs | Inhibit adipogenic differentiation | miR-140-5p sponge | Human | — | 2017 | [158] |
| MIR31HG | White adipose tissue | Promote adipogenic differentiation | Promote the histone modification of FABP4 to promote its expression | Human | Cytoplasm, nucleus | 2017 | [90] |
| HoxA-AS3 | White adipose tissue | Promote adipogenic differentiation | Promote EZH2 transcription and change the level of histone modification in the promoter region of RUNX2 | Human | — | 2018 | [92] |
| TINCR | ADSCs | Promote adipogenic differentiation | ceRNA,sponge miR-31-5p,C/EBP-α could bind to the promoter region of lncRNA TINCR to activate its expression | Human | — | 2018 | [74] |
| GAS5 | MSCs | Inhibit adipogenic differentiation | ceRNA,sponge miR-18a | Human | — | 2018 | [153] |
| HoxA11-AS1 | White adipose tissue | Promote adipogenic differentiation | Promote the expression of adipogenic differentiation | Human | — | 2018 | [132] |

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| | | | marker genes CEBPα, DGAT2, etc. | | | | |
| H19 | ADSCs | Inhibit adipogenic differentiation | miR-30a sponge | Human | — | 2019 | — |
| AC092159.2 | HPAV | Promote adipogenic differentiation; Promote lipid deposition | Inhibit TMEM18 | Human | — | 2019 | — |
| AC092834.1 | ADSCs | Inhibit adipogenic differentiation | Promote DKK1 expression and inhibit the Wnt-β-catenin pathway | Human | — | 2020 | [75] |
| MALAT1 | White adipose tissue | Promote adipogenic differentiation | Regulate PPARγ expression through PPAR pathway, fatty acid metabolism and insulin signal transduction pathway | Human | Mainly located in the nucleus | 2020 | [122] |

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| LINC00473 | Brown adipose tissue | — | Under the action of cAMP, LINC00473 is induced and shuttled into the cytoplasm, cross-linked with mitochondria and lipid droplets. | Human | — | 2020 | [95] |
| FOXC2-AS1 | White adipose tissue、Brown adipose tissue | Promote the browning of white fat; Maintain brown fat function | Autophagy signaling pathway; maintains the expression levels of UCP1 and peroxisome proliferator-activated receptors | Human | — | 2020 | — |
| lncDio3os | Brown adipose tissue | Improves brown fat activity | Maternally imprinted non-coding RNA increased methylation of the Dio3os promoter in the oocytes of obese mothers activates the transcriptional activity of Dio3 decreases the action of thyroxine T3, thereby suppressing the activity of brown fat thermogenic marker genes such as Prdm16 | Human | — | 2021 | [101] |

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| lncROR | Brown adipocyte;Human adipose-derived stem cells | Promote the differentiation of hADSCs to brown adipocytes | Long-stranded non-coding RNA up-regulated by adenovirus type 36 (Ad36) virus treatment in human adipose stem cells using siRNA interference with the lncROR gene significantly down-regulates the ability of human adipose stem cells to brown. | Human | — | 2021 | — |
| LYPLAL1-AS1 | ADSCs | Promote adipogenic differentiation | LYPLAL1-AS1/DSP complex onhibit Wnt/Wnt/β-catenin pathway | Human | — | 2021 | — |
| lnc13728 | Human adipose-derived stem cells | Promote the adipogenic differentiation of hADSCs | Interfering with the lnc13728 in hADSCs significantly downregulated the ability of MSCs to differentiate into lipids, as reflected in marker genes. Mainly, it promotes the expression of ZBED3 gene to suppress the pathway WNT/β-catenin | Human | — | 2021 | [76] |

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| lncRAP2 | White adipose tissue | Promote adipose tissue energy expenditure | The lncRAP2-Igf2bp2 complex enhances adipogenesis and energy expenditure by stabilizing target mRNAs. Thus, the lncRAP2-Igf2bp2 complex enhances adipogenesis and energy expenditure and is associated with susceptibility to obesity-associated diabetes | Human | Cytoplasm | 2021 | [84] |
| HOTAIR | Abdominal adipogenesis | HOTAIR overexpression using human immortalized abdominal preadipocytes | Inhibition of SLITRK4 and PITPNC1 gene expression by increasing their methylation and thus involvement in abdominal fat accumulation | Human | — | 2022 | — |
| lncXIST | Brown adipose tissue | Promote brown adipocyte differentiation | RNA-binding immunoprecipitation confirmed lncXIST binding to C/EBPα, and his partial role in promoting brown fat differentiation may be confirmed by this way. | Human | Mainly located in the nucleus | 2022 | [80] |

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| lnc-RAP-n | White adipose tissue | Inhibit adipogenic differentiation | bound to PPARγ and CEBPα promoter | Mouse | — | 2013 | — |
| SRA | White adipose tissue | Promote adipogenic differentiation | Promote the phosphorylation level of IRS-1 and Akt pathway | Mouse | Cytoplasm, nucleus | 2014 | [120] |
| lnc-BATE1 | Brown adipose tissue | Maintain brown fat function | Forms ribonucleoprotein complex with hnRNPU | Mouse | Cytoplasm, nucleus | 2015 | [93] |
| lnc-U90926 | White adipose tissue | Inhibit adipogenic differentiation | Inhibit the promoter transcriptional activity of PPARγ2 | Mouse | Mainly located in the cytoplasm | 2016 | [99] |
| uc.417 | Brown adipose tissue | Promote adipogenic differentiation of brown fat | Inhibit the phosphorylation level of p38MAPK pathway | Mouse | Mainly located in the nucleus | 2016 | [116] |
| Blnc1 | Brown adipose tissue | Promote adipogenic differentiation of brown fat | Forms Blnc1/hnRNPU/EBF2 ribonucleoprotein complex | Mouse&Human | Mainly located in the nucleus | 2016 | [83] |
| lnc-BATE10 | Brown adipose tissue | Promote adipogenic differentiation of brown fat | As a bait molecule binds CELF1 protein, thereby releasing and promoting the expression of Pgc1a | Mouse | Cytoplasm, nucleus | 2017 | [77] |

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| Paral1 | White adipose tissue | Promote adipogenic differentiation | Interacts with PSPC1 and hnRNP-like binding protein 14 (RBM14) to activate PPARγ | Mouse | Mainly located in the nucleus | 2017 | [104] |
| Gm15290 | White adipose tissue | Promote adipogenic differentiation | miR-27b sponge; regulates PPARγ levels | Mouse | — | 2017 | [87] |
| Adiponectin AS | White adipose tissue | Inhibit adipogenic differentiation | Forms a double-stranded complex with AdipoQ mRNA to inhibit its expression | Mouse | Cytoplasm, nucleus | 2018 | [82] |
| lnc-leptin | White adipose tissue | Inhibit adipogenic differentiation | As enhancer RNA | Mouse | — | 2018 | [102] |
| GAS5 | White adipose tissue | Inhibit adipogenic differentiation | Reduce the level of miR-21a-5p and significantly reduce the mRNA and protein levels of adipogenic marker genes; act as ceRNA for miR-21a-5p and improve the expression of phosphatase | Mouse | — | 2018 | [41] |

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| | | | and tensin homolog (PTEN) | | | | |
| Plnc1 | White adipose tissue | Promote adipogenic differentiation; Promote lipid deposition | Reduce the methylation level of the CpG region in the PPAR-γ2 promoter, enhance the transcriptional activity of the promoter, increase the transcription of PPAR-γ2; increase the transcriptional activity of the unmethylated PPAR-γ2 promoter | Mouse | — | 2018 | [100] |
| Bmncr | White adipose tissue | Inhibit adipogenic differentiation | Promote the formation of TAZ and RUNX2/PPARG transcription complex | Mouse | — | 2018 | [94] |
| H19 | White adipose tissue, brown adipose tissue; ectopic lipid deposition | Inhibit adipogenic differentiation、lipid deposition， | miR-188 sponge; maintains the thermogenic function of brown adipocytes; inhibits the expression of paternal alleles that promote the | Mouse | Cytoplasm, nucleus | 2018 | [88] |

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| | | maintain brown fat function | differentiation of white adipocytes | | | | |
| GM13133 | Brown adipose tissue | Promote adipogenic differentiation of brown fat；Promote the browning of white fat | Activate cAMP signaling pathway | Mouse | — | 2018 | [115] |
| AK079912 | Brown adipose tissue | Promote adipogenic differentiation of brown fat；Promote the browning of white fat | — | Mouse | Mainly located in the nucleus | 2018 | [130] |
| CAAlnc1 | White adipose tissue | Inhibit adipogenic differentiation | Blocks the binding of HuR to C/EBPα and PPARγ | Mouse | Mainly located in the cytoplasm | 2019 | [79] |

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| lnc-ORA | White adipose tissue | Promote adipogenic differentiation | Increase the mRNA and protein expression levels of cell cycle markers; regulate the DNA replication process through the PI3K/AKT/mTOR pathway | Mouse | Cytoplasm, nucleus | 2019 | [112] |
| lnc-OAD | White adipose tissue | Promote adipogenic differentiation | Increase the expression level of aP2, PPAR-γ and C/EBPa; reduce the expression of β-catenin, and inhibit cell proliferation in the MCE phase, and regulate adipogenesis through the WNT/β-catenin pathway | Mouse | — | 2019 | [113] |
| lncRNA Dreh | White adipose tissue | — | Interacts with vimentin and negatively correlates with GLUT4 expression | Mouse | — | 2019 | [129] |
| slincRAD | White adipose tissue | Promote adipogenic differentiation | Direct the methylation of promoters such as p21; direct the translocation of DNMT1 protein to the area around the nucleolus in the | Mouse | Mainly located in the nucleus | 2019 | [103] |

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| | | | S phase, and interact with DNMT1 to participate in DNA methylation | | | | |
| PGC1β-OT1 | White adipose tissue | Inhibit adipogenic differentiation | Decrease the protein levels of C/EBPα, PPARγ and aP2 in cells | Mouse | Cytoplasm, nucleus | 2019 | — |
| lnc 2310069B03Rik | White adipose tissue、Brown adipose tissue | Inhibit the browning of white fat | Reduce the expression level of UCP1; reduce other genes related to the function of beige adipocytes; act as a new inhibitor of β-adrenergic receptor inducing UCP1 at the transcriptional level | Mouse | — | 2019 | [128] |
| PVT1 | White adipose tissue | Promote adipogenic differentiation | Binds and interacts with STAT3 | Mouse | Mainly located in the nucleus | 2020 | [133] |
| lncSAMM50 | White adipose tissue | Promote adipogenic differentiation | Up-regulation of genes related to fat formation | Mouse | Mainly located in the nucleus | 2021 | [127] |

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| Ctcflos | White adipose tissue | Promote the brite adipocytes thermogenic | Using variable shearing to cut out more short isoforms of Prdm16, a browning gene that plays a very important role in white fat browning | Mouse | — | 2021 | [125] |
| lncFR332443 | White adipose tissue | Inhibit adipogenic differentiation | Significant inhibition of preadipocyte differentiation was achieved by unidirectional promotion of RUNX2 and phosphorylation of MAPK-p38 and MAPK-ERK1/2 expressions. | Mouse | — | 2021 | [117] |
| lncLIPE-AS1 | White adipose tissue | Promote adipogenic differentiation | Down-regulation of lipogenic differentiation genes such as C/EBPβ inhibits preadipocyte differentiation | Mouse | Mainly located in the nucleus | 2022 | [126] |