Table 1S: lncRNAs involved in RB pathogenesis.

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **lncRNA** | **Location†** | **Expression** | **Target Mechanism** | **Sample Type** | **Cellular Events** | **Survival**  | **Prognostic Factor** | **Role** **in Other Cancers** | **Validation Method** | **Reference** |
| AFAP1-AS1 | 4p16.1 | Overexpressed | - | RB cell lines (Weri-Rb1, Y79) and tumor tissues | Promotes proliferation, migration, and invasion | ShorterOS *p* < 0.001 | Independentprognostic factor*p* = 0.012 | Oncogenic role: lung cancer, hepatocellular carcinoma, cholangiocarcinoma, colorectal cancer, gastric cancer, pancreatic cancer, oesophageal squamous cell carcinoma, renal cell carcinoma, gallbladder cancer, ovarian cancer, tongue squamous cell carcinoma, nasopharyngeal carcinoma, and thyroidcancer | RT-PCR, PA, MA, IA | (Hao et al., 2018) |
| ANRIL | 9p21.3 | Overexpressed | *ATM-E2F1, miR-99a/c-Myc, miR-99a/JAK/STAT* and *miR-99a/PI3K/AKT* pathways | RB cell lines (HXO-RB44, Y79) and tumor tissues | Promotes cell viability, migration, and invasion | - | - | Oncogenic role: pancreatic cancer,osteosarcoma,bladder cancer, and prostate cancer | RT-PCR, PA, MA, IA, AA, WB, LUCA, IF | (Yang and Peng, 2018; Wang et al., 2019b) |
| BANCR | 9q21.12 | Overexpressed | *MAPK* and *NF-kB* pathways | RB cell lines (Weri-Rb1, Y79) and tumor tissues | Promotes proliferation, migration, and invasion | ShorterOS *p* < 0.001 | Independentprognostic factor *p* < 0.040 | Oncogenic role: melanoma, papillarythyroid carcinoma, and colorectal cancerTumor suppressive role: small and non-small cell lung cancer | RT-PCR, PA, MA, IA | (Su et al., 2015) |
| BDNF-AS | 11p14.1 | Underexpressed | *CDC42*, *cyclin E* and *BDNF* | RB cell lines (Weri-Rb1, Y79, SO-RB50, HXO-RB44, Rb116, Rb143) and tumor tissues | Inhibits proliferation, and migration | ShorterOS *p* = 0.009 | Independentprognostic factor*p* < 0.05 | Oncogenic role: lung cancer, and ovarian cancer | RT-PCR, PA, MA, WB | (Shang et al., 2018) |
| CCAT1 | 8q24.21 | Overexpressed | *miR-218-5p/MTF2* axis | RB cell lines (Weri-Rb1, Y79, SO-RB50) and tumor tissues | Promotes proliferation, migration, invasion, and EMTInhibits cell apoptosis | - | - | Oncogenic role: colon cancer, liver cancer, gallbladder cancer, and gastric cancer | RT-PCR, PA, MA, IA, AA, WB, LUCA | (Zhang et al., 2017; Meng et al., 2021) |
| CYTOR(LINC00152) | 2p11.2 | Overexpressed | *Caspase-3, caspase-8, ki-67, Bcl-2* and *MMP-9* | RB cell lines (SO-RB50, Y79) and tumor tissues | Promotes proliferation, colony formation, migration, and invasionInhibits cell apoptosis | - | - | Oncogenic role: gastric cancer, colorectal cancer, breast cancer, lung adenocarcinoma, glioma, clear cell renal cell carcinoma, tongue squamous cell carcinoma, gallbladder cancer, and hepatitis B virus-associated hepatocellular carcinoma | RT-PCR, PA, MA, IA, AA, WB, ATM | (Li et al., 2018b) |
| DANCR | 4q12 | Overexpressed | *Notch* pathway, *miR-34c* and *miR-613/MMP-9* axis | RB cell lines (Weri-Rb1, Y79, SO-RB50, HXO-RB44) and tumor tissues | Promotes proliferation, migration, invasion, and EMT | ShorterOS *p* = 0.056 | - | Oncogenic role: colorectal cancer | RT-PCR, PA, MA, IA, WB, LUCA, ATM | (Wang et al., 2018a) |
| FAM238B (LINC00202) | 10p12.1 | Overexpressed | *miR-3619-5p/RIN1*axis | RB cell lines (Weri-Rb1, Y79, SO-RB50, HXO-RB44) and tumor tissues | Promotes proliferation, migration, and invasion | ShorterOS *p* = 0.0227 | - | Oncogenic role: renal cancer | RT-PCR, PA, MA, IA, WB, LUCA | (Yan et al., 2019) |
| FEZF1-AS1 | 7q31.32 | Overexpressed | *miR-1236-3p* and *miR-363-3p/PAX6* axis | RB cell lines (Weri-Rb1, Y79, SO-RB50, RBL-13) and tumor tissues | Promotes cell viability, migration, invasion, and EMTInhibits cell apoptosis | ShorterDFS*p* < 0.001 | Independent prognosticfactor*p* = 0.001 | Oncogenic role: hepatocellular carcinoma, gastric cancer, lung adenocarcinoma, and breast cancer | RT-PCR, PA, MA, IA, AA, WB, LUCA, IHC, ATM | (Quan and Wang, 2019; Zhang et al., 2020; Liu et al., 2021) |
| H19 | 11p15.5 | Overexpressed Underexpressed | *miR-143/RUNX2* axis and *PI3K/Akt/mTOR* pathways*miR-17-92 cluster*, *p21* and *STAT3* pathways | RB cell lines (Weri-Rb1, Y79) and tumor tissuesRB cell lines (Weri-Rb1, Y79, SO-RB50) and tumor tissues | Regulates proliferation, migration, and invasion | ShorterOS *p* = 0.006- | Independent prognosticfactor*p* < 0.001- | Oncogenic role: gastric cancer, colorectal cancer, glioma, and bladder cancerTumor suppressive role: Wilms tumor. | RT-PCR, PA, MA, IA, AA, WB, LUCA, ATMRT-PCR, PA, AA, WB, IF | (Li et al., 2018a; Qi et al., 2019)(Zhang et al., 2018) |
| HOTAIR | 12q13.13 | Overexpressed | *Notch1* pathway and *miR-613/c-Met* axis | RB cell lines (HXO-RB44, Y79, SO-RB50, Weri-Rb1) and tumor tissues | Promotes cell viability, proliferation, invasion, and EMTInhibits cell apoptosis | ShorterOS *p* = 0.002 | Independentprognostic factor*p* < 0.05 | Oncogenic role: breast cancer, liver cancer, colorectal cancer,oesophageal squamous cancer, pancreatic cancer, non‐small cell lungcancer, and cervical cancer | RT-PCR, PA, IA, AA, WB, LUCA, ATM | (Dong et al., 2016; Yang et al., 2018) |
| HOXA11-AS | 7p15.2 | Overexpressed | *miR-506-3p/NEK3* axis | RB cell lines (HXO-RB44, Y79, SO-RB50, Weri-Rb1) and tumor tissues | Promotes proliferationInhibitscell apoptosis | - | - | Oncogenic role: renal cancer, hepatocellular carcinoma,laryngeal squamous cell carcinoma, non-small cell lung cancer, glioma, breast cancer, osteosarcoma, andgastric cancerTumor suppressive role: ovarian cancer, and colorectal cancer | RT-PCR, PA, AA, LUCA | (Han et al., 2019) |
| MALAT1 | 11q13.1 | Overexpressed | *miR-124/STX17*, *miR-20b-5p/STAT3*, *miR-655-3p/ATAD2* and *miR-124/Slug* axis | RB cell lines (HXO-RB44, Y79, SO-RB50, Weri-Rb1) and tumor tissues | Promotes proliferation, migration, invasion, and EMTInhibits cell apoptosis | - | - | Oncogenic role: pancreatic ductal adenocarcinoma, hepatocellular carcinoma, lung cancer, renal cancer, bladder cancer, and glioma | RT-PCR, PA, MA, IA, AA, WB, LUCA, IHC, ATM | (Huang et al., 2018; Liu et al., 2018; Wang et al., 2020b; Zhao et al., 2021) |
| MEG3 | 14q32.2 | Underexpressed | *Wnt/β-catenin* and*p53* pathways | RB cell lines (HXO-RB44, Y79, SO-RB50, Weri-Rb1) and tumor tissues | Suppresses proliferationPromotesapoptosis | ShorterOS *p* < 0.001 | Independentprognostic factor*p* = 0.011 | Tumor suppressive role: pituitary tumors, neuroblastoma, meningioma, glioma, non-small cell lung cancer, and colorectal cancer | RT-PCR, PA, AA, WB, LUCA | (Gao and Lu, 2016, 2017) |
| MIR7-3HG | 19p13.3 | Overexpressed  | *miR-27a-3p/PEG10* network | RB cell lines (Weri-Rb1, Y79) and tumor tissues | Promotes proliferationInhibits cell apoptosis | - | - | Oncogenic role: endometrial cancer | RT-PCR, PA, AA, WB, LUCA | (Ding et al., 2020) |
| MT1JP | 16q13 | Underexpressed | *Wnt/β-catenin* pathway, *cyclin D1* and *c-Myc* | RB cell lines (Weri-Rb1, Y79) and tumor tissues | Hinders proliferation, metastasis, invasion,and EMT | ShorterOS *p* = 0.002 | Independentprognostic factor*p* = 0.008 | Oncogenic role: hepatoblastoma, colon cancer, breast cancer, prostate cancer,and non-small cell lung cancer | RT-PCR, PA, MA, IA, AA, WB, LUCA | (Bi et al., 2018) |
| NEAT1 | 11q13.1 | Overexpressed | *miR-204/CXCR4* axis and *miR-124* | RB cell lines (Weri-Rb1, Y79, SO-RB50) and tumor tissues | Promotes proliferation, and migrationInhibits cell apoptosis | - | - | Oncogenic role: hepatocellular carcinoma, lungcancer, oesophageal cancer, colorectal cancer, renal cell carcinoma,ovarian cancer, breast cancer, and glioma | RT-PCR, PA, MA, AA, WB, LUCA, ATM | (Wang et al., 2019a; Zhong et al., 2019) |
| PANDAR | 6p21.2 | Overexpressed  | *Bcl-2/caspase-3* pathway | RB cell lines (HXO-RB44, Y79, SO-RB50, Weri-Rb1) and tumor tissues | Promotes proliferationInhibits cell apoptosis | - | - | Oncogenic role: pancreatic ductal adenocarcinoma, hepatocellular carcinoma,bladder cancer,cholangiocarcinoma, and gastric cancer | RT-PCR, PA, AA, WB, LUCA, IHC, ATM | (Sheng et al., 2018) |
| PlncRNA-1 | 21q22.12 | Overexpressed  | *CBR3* | RB cell lines (Weri-Rb1, Y79) and tumor tissues | Promotes proliferation, migration, and invasion | - | - | Oncogenic role:prostate cancer, colorectal cancer, hepatocellular carcinoma, oesophagealsquamous cell carcinoma, and gastric cancer | RT-PCR, PA, MA, IA, WB | (Wang et al., 2018b) |
| PVT1 | 8q24.21 | Overexpressed  | *miR-488-3p/Notch2* pathway | RB cell lines (HXO-RB44, Y79, SO-RB50, Weri-Rb1) and tumor tissues | Promotes proliferation, migration, and invasionInhibits cell apoptosis | ShorterOS *p* < 0.001 | - | Oncogenic role: renal cell carcinoma, lung cancer, cervical cancer, and breast cancer | RT-PCR, PA, MA, IA, AA, WB, LUCA, ATM | (Wu et al., 2019) |
| SNHG14 | 15q11.2 | Overexpressed | *miR-124/STAT3* pathway | RB cell lines (Weri-Rb1, Y79, SO-RB50) and tumor tissues | Promotes proliferation, migration, and invasionInhibits cell apoptosis | ShorterOS *p* = 0.032 | - | Oncogenic role: non-small cell lung cancer, cervical cancer, ovarian cancer, breast cancer, bladder cancer, and gastric cáncerTumor suppresive role: glioma | RT-PCR, PA, MA, IA, AA, WB, LUCA, ATM | (Sun et al., 2020) |
| SNHG16 | 17q25.1 | Overexpressed  | *miR-140-5p* | RB cell lines (Weri-Rb1, Y79, SO-RB50) and tumor tissues | Promotes proliferation, and colonyformationInhibits cell apoptosis | - | - | Oncogenic role: glioma, pancreatic cancer, osteosarcoma, bladder cancer, non-small lung cancer, papillarythyroid cancer, cervical cancer, gastric cancer, hepatocellularcarcinoma, and breast cancer | RT-PCR, PA, AA, LUCA, ATM | (Xu et al., 2019) |
| TCL6 | 14q32.13 | Underexpressed | *miR-21/PTEN/PI3K/Akt* pathway | RB cell lines (Weri-Rb1, Y79) and tumor tissues | Inhibits proliferationPromotes cell apoptosis | - | - | Tumor suppressive role: clear cell renal cell carcinoma | RT-PCR, PA, AA, WB, LUCA | (Tao et al., 2019) |
| THOR | 2q14.2 | Overexpressed  | *c-Myc/IGF2BP1* interaction | RB cell lines (Weri-Rb1, Y79) and tumor tissues | Promotes cell growth, migration, andinhibits cell apoptosis in retinoblastoma Y79 cells | - | - | Oncogenic role: melanoma, non-small cell lungcancer, osteosarcoma, and renal cell carcinoma | RT-PCR, PA, MA, AA, WB, ATM | (Shang, 2018) |
| TP73-AS1 | 1p36.32 | Overexpressed | *miR-139-3p* and *miR-874-3p/TFAP2B/ Wnt/β-catenin* pathway | RB cell lines (HXO-RB44, Y79, SO-RB50, Weri-Rb1) and tumor tissues | Promotes proliferation, metastasis, and invasion | ShorterOS*p* = 0.0016 | - | Oncogenic role: osteosarcoma, glioma, breast cancer | RT-PCR, PA, MA, IA, AA, WB, LUCA | (Xia et al., 2019; Wang et al., 2020a) |
| UCA1 | 19p13.12 | Overexpressed | *miR-513a-5p/STMN1* axis | RB cell lines (SO-RB50) and tumor tissues | Promotesproliferation, and multidrug resistance | ShorterOS*p* = 0.0084 | - | Oncogenic role: bladder carcinoma, gastric cancer,lung cancer, prostate cancer, breast cancer, thyroid cancer,and oesophageal cancer | RT-PCR, PA, WB, LUCA | (Yang et al., 2020) |
| XIST | Xq13.2 | Overexpressed | *miR-101/ZEB1-ZEB2, miR-124/STAT3* and *miR-140-5p/SOX4* axis | RB cell lines (HXO-RB44, Y79, SO-RB50, Weri-Rb1) and tumor tissues | Promotes proliferation, migration, invasion, and EMTInhibits cell apoptosis | - | - | Oncogenic role: colorectal cancer, pancreatic cancer, non-small cell lungcancer, osteosarcoma, hapatocelullar carcinoma, gastric cancer, and bladder cancerTumor suppressive role: prostate cancer, and breast cancer | RT-PCR, PA, MA, IA, AA, WB, LUCA | (Hu et al., 2018; Cheng et al., 2019; Wang et al., 2020c) |
| ZFPM2-AS1 | 8q23.1 | Overexpressed | *miR-515/HOXA1/ Wnt/β-catenin* axis | RB cell lines (Weri-Rb1, Y79, SO-RB50) and tumor tissues | Pomotes cell viability,migration, and invasion | ShorterOS*p* = 0.006 | - | Oncogenic role: renal cell cancer, lung adenocarcinoma, and gastric carcinogenesis | RT-PCR, PA, MA, IA, AA, WB, LUCA, IF, IHC, ATM | (Lyv et al., 2020) |

Abbreviations: EMT: epithelial-mesenchymal transition; RT-PCR: real time polymerase chain reaction; PA: proliferation in vitro assay; MA: migration in vitro assay; DFS: disease-free survival; OS: overall survival; IA: invasion in vitro assay; AA: apoptosis in vitro assay; WB: western blot immunodetection; LUCA: luciferase expression assays; IF: immunofluorescence; IHC: immunohistochemistry; ATM: animal tumor models.**†** Information obtained from GeneCards database. (www.genecards.org).

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