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 | Shorter  OS  *p* < 0.001 | Independent  prognostic 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 thyroid  cancer | 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 | Shorter  OS  *p* < 0.001 | Independent  prognostic factor  *p* < 0.040 | Oncogenic role: melanoma, papillary  thyroid carcinoma, and colorectal cancer  Tumor 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 | Shorter  OS  *p* = 0.009 | Independent  prognostic 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 EMT  Inhibits 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 invasion  Inhibits 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 | Shorter  OS  *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 | Shorter  OS  *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 EMT  Inhibits cell apoptosis | Shorter  DFS  *p* < 0.001 | Independent prognostic  factor  *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 tissues  RB cell lines (Weri-Rb1, Y79, SO-RB50) and tumor tissues | Regulates proliferation, migration, and invasion | Shorter  OS  *p* = 0.006  - | Independent prognostic  factor  *p* < 0.001  - | Oncogenic role: gastric cancer, colorectal cancer, glioma, and bladder cancer  Tumor suppressive role: Wilms tumor  . | RT-PCR, PA, MA, IA, AA, WB, LUCA, ATM  RT-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 EMT  Inhibits cell apoptosis | Shorter  OS  *p* = 0.002 | Independent  prognostic factor  *p* < 0.05 | Oncogenic role: breast cancer, liver cancer, colorectal cancer,  oesophageal squamous cancer, pancreatic cancer, non‐small cell lung  cancer, 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 proliferation  Inhibits  cell apoptosis | - | - | Oncogenic role: renal cancer, hepatocellular carcinoma,  laryngeal squamous cell carcinoma, non-small cell lung cancer, glioma, breast cancer, osteosarcoma, and  gastric cancer  Tumor 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 EMT  Inhibits 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 proliferation  Promotes  apoptosis | Shorter  OS  *p* < 0.001 | Independent  prognostic 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 proliferation  Inhibits 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 | Shorter  OS  *p* = 0.002 | Independent  prognostic 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 migration  Inhibits cell apoptosis | - | - | Oncogenic role: hepatocellular carcinoma, lung  cancer, 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 proliferation  Inhibits 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, oesophageal  squamous 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 invasion  Inhibits cell apoptosis | Shorter  OS  *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 invasion  Inhibits cell apoptosis | Shorter  OS  *p* = 0.032 | - | Oncogenic role: non-small cell lung cancer, cervical cancer, ovarian cancer, breast cancer, bladder cancer, and gastric cáncer  Tumor 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 colony  formation  Inhibits cell apoptosis | - | - | Oncogenic role: glioma, pancreatic cancer, osteosarcoma, bladder cancer, non-small lung cancer, papillary  thyroid cancer, cervical cancer, gastric cancer, hepatocellular  carcinoma, 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 proliferation  Promotes 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, and  inhibits cell apoptosis in retinoblastoma Y79 cells | - | - | Oncogenic role: melanoma, non-small cell lung  cancer, 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 | Shorter  OS  *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 | Promotes  proliferation, and multidrug resistance | Shorter  OS  *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 EMT  Inhibits cell apoptosis | - | - | Oncogenic role: colorectal cancer, pancreatic cancer, non-small cell lung  cancer, osteosarcoma, hapatocelullar carcinoma, gastric cancer, and bladder cancer  Tumor 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 | Shorter  OS  *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](about:blank)).

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