

**Table S1 CircRNAs involved in osteoarthritis**

| CircRNA ID       | MicroRNA    | Target gene                | Function  | Reference            |
|------------------|-------------|----------------------------|---|----------------------|
| CircTMBIM6       | miR-27a     | MMP13                      | promote ECM degradation   | (Bai et al., 2020)   |
| hsa_circ_0005105 | miR-26a     | NAMPT, MMP-13 and ADAMTS-4 | promote ECM degradation   | (Wu et al., 2017)    |
| circRNACER       | miR-136     | MMP-13                     | promote ECM degradation   | (Liu et al., 2016)   |
| circRNA-9119     | miR-26a     | PTEN                       | Inhibit chondrocyte apoptosis                                     | (Chen et al., 2020)  |
| circZNF652       | /           | PTEN                       | Promote chondrocyte apoptosis                                     | (Yuan et al., 2021)  |
| circRNA_0092516  | miR-337-3p  | PTEN                       | inhibit chondrocyte apoptosis                                     | (Huang et al., 2021) |
| CircCDH13        | miR-296-3p  | PTEN                       | promote chondrocyte apoptosis                                     | (Zhou et al., 2021)  |
| CircSEC24A       | miR-142-5p  | SOX5                       | promote chondrocyte apoptosis and inflammation                    | (Shi et al., 2021)   |
| circ_0114876     | miR-671     | TRAF2                      | promote chondrocyte apoptosis and inflammation                    | (Wang et al., 2021)  |
| circ_0001103     | miR-375     | SIRT1                      | attenuate chondrocyte apoptosis, inflammation and ECM degradation | (Zhang et al., 2021) |
| circSLC7A2       | miR-4498    | TIMP3                      | Alleviate OA progression  | (Ni et al., 2021)    |
| circ0083429      | miR-346     | SMAD3                      | Alleviate OA progression  | (Yao et al., 2020)   |
| circCDK14        | miR-125a-5p | SMAD2                      | Alleviate OA progression  | (Shen et al., 2020)  |
| circRNA.33186    | miR-127-5p  | MMP-13                     | promote chondrocyte apoptosis and contributes to OA pathogenesis  | (Zhou et al., 2019)  |
| circPDE4D        | miR-103a-3p | FGF18                      | Alleviate OA progression  | (Wu et al., 2021)    |

MMP-13: matrix metalloproteinases-13, NAMPT: nicotinamide phosphoribosyl transferase, PTEN: phosphatase and tensin homolog, ADAMTS-4: a disintegrin and metalloproteinase with thrombospondin motifs type 4, SOX5: sex-determining region Y-box protein 5, TRAF2: TNF receptor-associated factor 2, SIRT1: silencing information regulator 2-related enzyme 1, TIMP3: tissue inhibitors of metalloproteinase 3, Smad: Sma- and Mad-related protein, FGF18: fibroblast growth factor 18.

**Table S2 CircRNAs involved in osteoporosis**

| CircRNA ID       | MicroRNA       | Target gene    | Function  | Reference            |
|------------------|----------------|----------------|---|----------------------|
| mm9_circ_009056  | miR-22-3p      | BMP7 and Runx2 | Promote osteogenic differentiation                        | (Wu et al., 2018)    |
| circ_0024097     | miR-376b-3p    | YAP1           | Promote osteogenic differentiation                        | (Huang et al., 2020) |
| hsa_circ_0076906 | miR-1305       | OGN            | Promote osteogenic differentiation                        | (Wen et al., 2020)   |
| circ_0062582     | miR-145        | CBFB           | Promote osteogenic differentiation and cell proliferation | (Li et al., 2021)    |
| circRNA_28313    | miR-195a       | CSF1           | Promote osteoclast differentiation                        | (Chen et al., 2019)  |
| circRNA_009934   | miR-5107       | TRAF6          | Promote osteoclast differentiation                        | (Miao et al., 2020)  |
| circHmbox1       | miR-1247-5p    | Bcl6           | inhibit osteoclast differentiation                        | (Liu et al., 2020)   |
| hsa_circ_0021739 | hsa-miR-502-5p | /              | inhibit osteoclast differentiation                        | (Guan et al., 2021)  |

BMP7: bone morphogenetic protein 7, Runx2: runt-related transcription factor 2, YAP1: yes-associated protein 1, OGN: osteoglycin, CBFB: core-binding factor subunit  $\beta$ , CSF1: colony-stimulating factor 1, TRAF6: TNF receptor associated factor 6, Bcl6: B cell lymphoma 6.

**Table S3 CircRNAs involved in osteosarcoma**

| CircRNA ID       | MicroRNA   | Target gene                     | Function  | Reference            |
|------------------|------------|---------------------------------|---|----------------------|
| circ_0000885     | miR-1249   | FGFR1                           | promoted proliferation, cell cycle, migration and invasion. | (Chen et al., 2020)  |
| circ_0000285     | miR-409-3p | IGFBP3                          | promote proliferation, migration, and invasion              | (Long et al., 2020)  |
| Has_circ_0000285 | miRNA-599  | TGFB2                           | promote proliferation and migration                         | (Zhang et al., 2020) |
| CircUBAP2        | miR-143    | Bcl2                            | promotes osteosarcoma growth and progression                | (Zhang et al., 2017) |
|                  | miR-641    | YAP1                            | promote proliferation and invasion                          | (Wu et al., 2020)    |
|                  | miR-204-3p | HMGA2                           | promote proliferation, migration, and invasion              | (Ma et al., 2021)    |
| CircUBAP2        | miR-506-3p | SEMA6D                          | promote proliferation, migration, and invasion              | (Gong et al., 2020)  |
|                  | miR-524    | RASSF6                          | suppress cell viability, migration and invasion             | (Zhou et al., 2021)  |
| circITCH         | miR-22     | PTEN/PI3K/AKT and SP-1 pathways | suppress cell growth, proliferation, migration and invasion | (Ren et al., 2019)   |
| circITCH         | miR-7      | EGFR                            | Promote migration, and invasion                             | (Li et al., 2020)    |
| CircHIPK3        | miR-637    | STAT3                           | Promote proliferation, migration, and invasion              | (Huang et al., 2020) |
|                  | miR-637    | HDAC4                           | promote proliferation, migration, and invasion              | (Wen et al., 2021)   |

FGFR1: fibroblast growth factor receptor 1, IGFBP3: Insulin-like growth factor binding protein 3, TGFB2: transforming growth factor  $\beta$ 2, HMGA2: high mobility group AT-hook 2, RASSF6: Ras-association domain family number 6, EGFR: epidermal growth factor receptor, STAT3: signal transducer and activator of transcription 3, HDAC4: histone deacetylase 4.

**Table S4 CircRNAs involved in multiple myeloma**

| CircRNA ID       | MicroRNA   | Target gene | Function  | Reference           |
|------------------|------------|-------------|---|---------------------|
| hsa_circ_0007841 | miR-338-3p | BRD4        | promote the proliferation, cell cycle and motility            | (Wang et al., 2020) |
|                  | miR-129-5p | JAG1        | promote proliferation, metastasis and chemoresistance         | (Wang et al., 2020) |
|                  | /          | ABCG2       | Promote acquired chemotherapy resistance                      | (Song et al., 2020) |
| hsa_circ_0069767 | miR-636    | K-RAS       | promoted cell apoptosis                                       | (Chen et al., 2020) |
| circCDYL         | miR-1180   | YAP         | promote proliferation and MM progression                      | (Chen et al., 2020) |
| circ_0000142     | miR-610    | AKT3        | promote proliferation, migration, invasion                    | (Liu et al., 2021)  |
| Circ_0000190     | miR-767-5p | MAPK4       | inhibited cell viability, proliferation and induced apoptosis | (Feng et al., 2019) |
| circRERE         | miR-152-3p | CD47        | Promote acquired BTZ resistance                               | (Fang et al., 2021) |
| circITCH         | miR-615-3p | PRKCD       | Promote acquired BTZ resistance                               | (Liu et al., 2020)  |

BRD4: bromodomain-containing 4, JAG1: Jagged1, ABCG2: ATP-binding cassette superfamily G member 2, K-RAS: Kirsten ras, AKT3: RAC- $\gamma$  serine/threonine-protein kinase, MAPK4: mitogen-activated protein kinase 4, CD47: cluster of differentiation 47, PRKCD: protein kinase C- $\delta$ .

**Table S5 CircRNAs involved in intervertebral disc degeneration**

| CircRNA ID     | MicroRNA    | Target gene | Function  | Reference              |
|----------------|-------------|-------------|---|------------------------|
| circGLCE       | miR-587     | STAP1       | enhance NP cells apoptosis and matrix degrading enzyme expression | (Chen et al., 2020)    |
| circRNACIDN    | miR-34a-5p  | SIRT1       | inhibited apoptosis and NP ECM degradation.                       | (Xiang et al., 2020)   |
| circ_001653    | miR-486-3p  | CEMIP       | Promote apoptosis and NP ECM degradation.                         | (Chen and Zhang, 2020) |
| circPKNOX1     | miR-370-3p  | KIAA0355    | inhibit NP cells apoptosis  | (Huang et al., 2021)   |
| circARL15      | miR-431-5p  | DISC1       | inhibit NP cells apoptosis  | (Wang et al., 2021)    |
| circERCC2      | miR-182-5p  | SIRT1       | inhibit NP cells apoptosis  | (Xie et al., 2019)     |
| circ-FAM169A   | miR-583     | Sox9        | Promote apoptosis and NP ECM degradation.                         | (Li et al., 2021)      |
|                | miR-583     | BTRC        | Promote NP ECM degradation.                                       | (Guo et al., 2020)     |
| circRNA_104670 | miRNA-17-3p | MMP-2       | Promote apoptosis and NP ECM degradation.                         | (Song et al., 2018)    |
| circITCH       | miR-17-5p   | Sox4        | Promote apoptosis and NP ECM degradation.                         | (Zhang et al., 2021)   |

STAP1: signal-transducing adaptor family member 1, CEMIP: cell migration-inducing protein, DISC1: disrupted in schizophrenia 1, BTRC:  $\beta$ -transducin repeat-containing E3 ubiquitin protein ligase.

**Table S6 CircRNAs involved in rheumatoid arthritis**

| CircRNA ID       | MicroRNA   | Target gene | Function   | Reference            |
|------------------|------------|-------------|--|----------------------|
| circAFF2         | miR-650    | CNP         | promote RAFLSs proliferation, inflammation and migration           | (Qu et al., 2021)    |
|                  | miR-375    | TAB2        | promote RAFLSs proliferation and inflammation                      | (Zhi et al., 2021)   |
| circ_0088194     | miR-766-3p | MMP2        | promote RAFLSs migration and invasion                              | (Cai et al., 2021)   |
| circASH2L        | miR-129-5p | HIPK2       | promote RAFLSs proliferation, migration, invasion and inflammation | (Li et al., 2021)    |
| circMAPK9        | miR-140-3p | PPM1A       | promote RAFLSs proliferation, migration, invasion and inflammation | (Luo et al., 2021)   |
| hsa_circ_0088036 | miR-140-3p | SIRT 1      | Promote RAFLSs proliferation and migration                         | (Zhong et al., 2020) |

CNP: 2',3'-Cyclic nucleotide 3'-phosphodiesterase, TAB2: TAK1-binding 2, HIPK2: homeodomain interacting protein kinase 2, PPM1A: protein phosphatase magnesium-dependent 1A.