

Supplementary Table 5. Annotation for MCODE of protein-protein interaction enrichment network for high frequency DE-mRNAs.

| Network | Annotation |
|-----------------------|---|
| Input ID | GO:0032787 monocarboxylic acid metabolic process -24.6;GO:0009611 response to wounding -23.6;hsa04610 Complement and coagulation cascades -22.6 |
| Input ID_MCODE_ALL | GO:0032787 monocarboxylic acid metabolic process -16.6;hsa01230 Biosynthesis of amino acids -16.0;GO:0044282 small molecule catabolic process -15.0 |
| Input ID_SUB2_MCODE_1 | R-HSA-211897 Cytochrome P450 - arranged by substrate type -23.3;R-HSA-211945 Phase I - Functionalization of compounds -21.4;R-HSA-211859 Biological oxidations -18.4 |
| Input ID_SUB1_MCODE_2 | R-HSA-381426 Regulation of Insulin-like Growth Factor (IGF) transport and uptake by Insulin-like Growth Factor Bi -5.1;R-HSA-71387 Metabolism of carbohydrates -4.0;GO:0031589 cell-substrate adhesion -3.8 |
| Input ID_SUB1_MCODE_3 | R-HSA-375276 Peptide ligand-binding receptors -14.6;R-HSA-373076 Class A/1 (Rhodopsin-like receptors) -13.0;R-HSA-418594 G alpha (i) signalling events -12.4 |
| Input ID_SUB1_MCODE_4 | hsa01230 Biosynthesis of amino acids -8.5;GO:0044282 small molecule catabolic process -7.4;hsa00270 Cysteine and methionine metabolism -6.7 |
| Input ID_SUB1_MCODE_5 | GO:0046364 monosaccharide biosynthetic process -14.4;hsa01200 Carbon metabolism -14.0;GO:0016051 carbohydrate biosynthetic process -12.3 |
| Input ID_SUB1_MCODE_6 | R-HSA-5686938 Regulation of TLR by endogenous ligand -8.8;M264 PID TOLL ENDOGENOUS PATHWAY -8.4;R-HSA-6803157 Antimicrobial peptides -6.6 |
| Input ID_SUB1_MCODE_7 | M166 PID ATF2 PATHWAY -7.9;GO:0009991 response to extracellular stimulus -5.0;R-HSA-2262752 Cellular responses to stress -4.8 |

Supplementary Table 6. Survival analysis for Differential expressed miRNAs in TCGA-LIHC.

| ID | log-rank P value | factor | HR | up95 | low95 |
|-------------------|-------------------------|---------------|-----------|-------------|--------------|
| hsa-miR-101-3p | 0.002255 | protect | 0.578932 | 0.820239 | 0.408615 |
| hsa-miR-139-5p | 2.43E-07 | protect | 0.394906 | 0.56083 | 0.278072 |
| hsa-miR-511-5p | 0.391565 | protect | 1.163998 | 1.648429 | 0.821928 |
| hsa-let-7c-3p | 0.509074 | protect | 0.88955 | 1.259684 | 0.628172 |
| hsa-miR-125b-2-3p | 0.061228 | protect | 0.718071 | 1.017179 | 0.506917 |
| hsa-miR-34c-5p | 0.52498 | risk | 1.11925 | 1.584939 | 0.79039 |
| hsa-miR-378c | 0.277779 | protect | 0.82486 | 1.168134 | 0.582463 |
| hsa-miR-5589-5p | 0.229327 | protect | 0.809008 | 1.14691 | 0.570659 |
| hsa-miR-99a-5p | 0.008725 | protect | 0.627161 | 0.888743 | 0.442571 |
| hsa-miR-34c-3p | 0.978891 | protect | 1.004682 | 1.422972 | 0.709351 |
| hsa-miR-5589-3p | 0.420898 | protect | 0.867101 | 1.228034 | 0.61225 |
| hsa-miR-877-5p | 0.016982 | risk | 1.529861 | 2.167074 | 1.080017 |
| hsa-miR-671-5p | 0.295045 | risk | 1.202313 | 1.702882 | 0.848888 |
| hsa-miR-378a-3p | 0.196099 | risk | 1.257156 | 1.781223 | 0.887279 |
| hsa-miR-301a-3p | 0.008197 | risk | 1.595768 | 2.262316 | 1.125605 |
| hsa-miR-187-3p | 0.538865 | risk | 1.11492 | 1.579794 | 0.786841 |
| hsa-miR-138-5p | 0.650067 | risk | 0.921018 | 1.311126 | 0.646981 |
| hsa-miR-4524a-3p | 0.399592 | protect | 0.861413 | 1.219765 | 0.60834 |
| hsa-miR-223-3p | 0.951984 | risk | 1.010698 | 1.431194 | 0.713747 |
| hsa-let-7a-2-3p | 0.679079 | protect | 0.929348 | 1.315997 | 0.656299 |
| hsa-miR-375-3p | 0.456514 | protect | 0.876533 | 1.2419 | 0.618658 |
| hsa-miR-223-5p | 0.742728 | protect | 0.943599 | 1.336783 | 0.666061 |
| hsa-miR-5588-3p | 0.012826 | protect | 0.640822 | 0.907489 | 0.452515 |
| hsa-miR-3189-3p | 0.023056 | risk | 1.490708 | 2.122278 | 1.047088 |
| hsa-miR-3680-3p | 0.127824 | risk | 1.30919 | 1.855126 | 0.923915 |
| hsa-miR-17-3p | 0.083783 | risk | 0.733445 | 1.038702 | 0.517898 |
| hsa-miR-194-3p | 0.165805 | protect | 0.782338 | 1.108308 | 0.55224 |
| hsa-miR-135b-5p | 0.072067 | risk | 1.376916 | 1.949932 | 0.972289 |
| hsa-miR-7112-3p | 0.515253 | risk | 1.123438 | 1.602959 | 0.787365 |
| hsa-miR-205-5p | 0.171105 | risk | 1.272456 | 1.804744 | 0.89716 |
| hsa-miR-100-5p | 0.003693 | protect | 0.598643 | 0.849333 | 0.421947 |
| hsa-miR-146a-5p | 0.745306 | protect | 1.059352 | 1.500225 | 0.748039 |
| hsa-miR-24-2-5p | 0.081881 | risk | 1.362826 | 1.9299 | 0.962379 |
| hsa-miR-885-5p | 0.169666 | protect | 0.784611 | 1.112856 | 0.553184 |
| hsa-miR-885-3p | 0.603559 | protect | 1.09687 | 1.554033 | 0.774195 |
| hsa-miR-1262 | 0.014415 | risk | 1.539902 | 2.184093 | 1.085713 |
| hsa-miR-582-5p | 0.388832 | risk | 1.164231 | 1.650574 | 0.821189 |
| hsa-miR-582-3p | 0.022381 | risk | 1.493008 | 2.120278 | 1.051312 |
| hsa-miR-210-5p | 0.024344 | risk | 1.491626 | 2.113712 | 1.052627 |
| hsa-miR-217-5p | 0.826759 | protect | 1.039643 | 1.472817 | 0.733871 |
| hsa-miR-625-3p | 0.578341 | protect | 1.103574 | 1.562673 | 0.779354 |
| hsa-miR-29b-1-5p | 0.870187 | risk | 1.029333 | 1.457906 | 0.726746 |
| hsa-miR-21-3p | 0.060608 | risk | 1.393654 | 1.97479 | 0.983533 |
| hsa-miR-561-5p | 0.0075 | risk | 1.62099 | 2.40279 | 1.093566 |
| hsa-miR-541-3p | 0.568232 | protect | 1.106522 | 1.566843 | 0.781438 |
| hsa-miR-216b-3p | 0.46815 | risk | 1.150479 | 1.701683 | 0.77782 |
| hsa-miR-1224-5p | 0.886944 | risk | 1.025507 | 1.452126 | 0.724225 |
| hsa-miR-5588-5p | 0.089422 | protect | 0.739409 | 1.047195 | 0.522086 |
| hsa-miR-2355-3p | 0.008464 | risk | 1.595746 | 2.261333 | 1.126063 |
| hsa-miR-216a-3p | 0.335209 | risk | 1.186604 | 1.680295 | 0.837965 |
| hsa-miR-4449 | 0.844205 | protect | 1.035457 | 1.466219 | 0.731249 |
| hsa-miR-653-5p | 0.577505 | protect | 1.103923 | 1.563284 | 0.779543 |

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|-----------------|----------|---------|----------|----------|----------|
| hsa-miR-194-5p | 0.004083 | protect | 0.601321 | 0.851918 | 0.424439 |
| hsa-miR-548v | 0.174238 | risk | 1.271901 | 1.802342 | 0.897572 |
| hsa-miR-141-3p | 0.535513 | risk | 1.115914 | 1.580405 | 0.787941 |
| hsa-miR-216a-5p | 0.342731 | protect | 1.18372 | 1.676152 | 0.835959 |
| hsa-miR-155-5p | 0.45926 | risk | 1.140173 | 1.614518 | 0.805191 |
| hsa-miR-216b-5p | 0.131044 | protect | 1.308972 | 1.853506 | 0.924414 |
| hsa-miR-155-3p | 0.832344 | risk | 1.038098 | 1.470129 | 0.733029 |
| hsa-miR-210-3p | 0.000975 | risk | 1.791011 | 2.541255 | 1.262258 |
| hsa-miR-629-5p | 0.040936 | protect | 1.442479 | 2.042647 | 1.018651 |
| hsa-miR-642a-5p | 0.690464 | risk | 1.073046 | 1.519633 | 0.757701 |
| hsa-miR-200c-3p | 0.038228 | risk | 1.443662 | 2.045728 | 1.018786 |