**S1 Text**

Annotated target sequences.

**Key**

mA, mU, mC, mG 2’O-Methyl (2’OMe)-modified RNA nucleotides

iMe-dC methylated deoxy-Cytosine

\* phosphorothioate bond

**ATG** translational start

MO targeting site blue text

ASO targeting site turquoise or green (best ASO knockdown efficiency) highlight

***alk8/acvrl1***

MO GATTCATGTTTGTGTTCAATTTCCG

Alk8 2’OMe ASO#1 (GC = 35%)

mC\*mA\*mU\*mG\*mU\*T\*T\*G\*T\*G\*T\*T\*C\*A\*A\*mU\*mU\*mU\*mC\*mC

Alk8 2’OMe ASO#2 (GC = 55%)

mG\*mU\*mG\*mC\*mU\*G\*C\*A\*A\*T\*G\*C\*C\*C\*C\*mA\*mU\*mU\*mU\*mG

>NM\_131345.1

gtccggcagacagtctgtcagcgctgaaaacacgacttcgaataaaagagtgatattacggaaattgaacacaaacatgaatctgcattgcagctaaaggatccaatgggaagacagagtctggctgtgcgaatactgaaaggcagcgctgagagtcacttgaggagttgtacaatgcattgaaccaa**ATG**gggcattgcagcacccaaatcatcatcctgttcctgcttcagttcttacagacatcagctaaagatgtctccattgactgcatgtgtgtcggcagtgactgtaatgagcagcagtgtactggtgaccagtgttacacctccgttatcattagcaatgatgtgacgacgttcaagcggggctgcttgatcgggccggcgagcaagcgcatgacctgctccgcaacagcttctgctagtcatgtggtagaatgctgttctcaacacatgtgcaacgccaacgtctccaaagagaccctacttcgactgctgctcacaagtccagaagaaaagaagactgttcattaccgcgtggaaatgttggttctgtttgtgttggggccgtttgtggttctgggtctgctgtcttttctggctttgctggtgtgccgtcgactccatcatgggcgtctggagagactgcacgagtttgacactgaacagggggccatcgatgggcttatcgcgtctaatgttggagacagcacacttgcggatctgatggatcactcctgcacttcaggcagtggttcaggactgcccttcctggttcagagaacggttgcgcggcagatcagcctggtggagtgtgttggtaaaggacggtacggtgaagtgtggagaggtcaatggcaaggagaaaatgtagccgtgaagatcttttcctctagagatgagaagtcatggtttcgagaaacagaaatttacaacactgttctgctacgacatgaaaatatattaggcttcatggcttctgacatgacctcccgaaactctagcactcagctgtggctgatcacacactatcacgagaatggctctctgtatgactacctgcagcgtgtggctgtggagatggcagatggactgcacatggcggcgtcgattgccagcggactggtgcacctgcacacggagatctttggcacggagggcaaaccggccatcgctcacagagacctgaagagcaagaacatccttgtgaagaaagatttgcagtgctgcatcgctgacctgggtctggcagtaacacacacgcagtctgataatcagcttgatgtgggaaataatcctaaagtgggaaccaaacgctacatggcaccggaggttctagatgagaccattcagacggactgttttgacgcctataagagggtggatatctgggcctttgggttggtgctgtgggagatcgcacgcagaaccatcagcaatggaattgtagaggaatacaagccgcctttctatgacctggttcctaatgatcccagctttgacgacatgaggaaagtggtttgtgtggagcagcaaaggccattcattcccaaccgctggttttcagatcctaccctgtctgctctggtgaagctgatgaaagagtgctggtaccagaacccctcggctcgtctcactgccctgcgcatcaaaaagactctggataaaatccacagttcactggagaagggcaaaaccgactgctgaggagagagagagctgcagaactactgaccgctcacccgctcattatacagacactgtgtgtaaccaaaccattggattccagcgctggcatctgtcccaactctaacatgctgtttatttgctttattcttcttgttcattggcctaaaaacttttttatagagaattacgctctcttttatggattttatttttccccccactgaacgcggtgtaactcacatttaccctcaagaagcaacaaaaaggacagagacgccatcaaatatgtggacgcacactgacaggccttgaagaaaccctctgtcatggatttttttaacagcatcatgttgtctatttaaccattggcagactttaaagatttgtacttttcagaaaaatgaaaaggacggatacacacatgctgaaatgcaatcagtctcataatgtgtgtgtgtgcacatgattcttgttacaaccagaaaaacttcatagctgtaacatcacctgcttttagacatctggtgggttttgagctttttaaaggtcctgatagttcttgtagataggttaggcaaagttagtcacagttttgctatatggacttatcataaaaccggttggttgcttaatgccactatgtacagtaggaatcaacaggcttctttctttaattaggcctgtttagtgaccagacctgggttttgaactagtggtaaaaaaaaaaaaaattctgtcatcatgtaattccaaaaataaataactttttcagtgggaaaaacacagaaaaagatgttttaaagaatgctcacgctgctctttttccatacagtgagcacatattgtggcatgctctctaaaaattaacgaaaaccgttcatatattgtttggaatgacatgaatgatgagagaataattttttttatatatatatatatatatttttgtttgggtgaactcgcagtctggtcattctcatagcaccctatgagggcttccctttgacacaaggcctttctgacctgttgcctctatgcctgcctgactaaaagccattgtagcacaccgtagtgcttttttgttttatttttttgtagctgttgtctttatttttgccctcacaggcatgcgtacttgatgtttgttcaatgacaatcagccgctgtccagtagggcctgaactatttgctgtcatgtacaaaaccctacttatgagcttttaaggtgacgtctcagcacactaacagagctagtcatgatcataaatagactctggttttgtgaatttgcgtatttgtttaccctcatgcttttttcacactttttgtatcacagttttcaacacgcaccatgagccgagagaattcggatgcttttaaaactttaaacgctttttgactatttaaaagtgacactctaatataggatggaagaggtttacaaaggaaaatgctattgttgtataccgaatggcttgtgtatgttgctaatggtttgggtaaagtgaaatggtttgaatttaatttttttaatttgggaaaaatgggtcctgatacactacaactttcacttctggtcgcttttgctctcctataaaaccaaacgtttacatgtttgtgttgacctggggagcgatgttaggaattaagactacagcagctattgcattatgaactgtgaatgttataatgaagaaaccttatgtatgatgttactggaatactgaatgcgggttaagaattaaaaggaaatctgctttttttcaaaaaaaaaaaaaaaaaa

***bmp2b***

MO CGCGGACCACGGCGACCATGATC

Bmp2b 2’OMe ASO#1 (GC = 65%)

mG\*mG\*mA\*mC\*mC\*A\*/iMe-dC/\*G\*G\*/iMe-dC/\*G\*A\*C\*C\*A\*mU\*mG\*mA\*mU\*mC

Bmp2b 2’OMe ASO#2 (GC = 60%)

mA\*mC\*mA\*mG\*mA\*G\*A\*G\*T\*/iMe-dC/\*G\*T\*/iMe-dC/\*G\*C\*mA\*mG\*mC\*mU\*mC

>NM\_131360.1 gaattcggcacgaggcgtgctgcacgcagagatgagtctccaaacagccacggaaaacttctgctgaccacaagttttcgatttctttaaaacaaaaacaaaaaatgacaaatccaggattgtgcgatctcgcgctgtcacttttgggattgctgctgtctttgacctgagcgctcgcgcacttcattagagtttagtagagtctagtctgaagtgttgcacaagtatgaacaagaagaggcgacttgagctgcgacgactctctgtcgtgggataaaaaatcgcttgtggattaaacacgaattcatgaggaacttaggagacgacgggaacgcagaccggccacagcgcttcctcctccggaactgactgatc**ATG**gtcgccgtggtccgcgctctcacggtgctgttgctcggtcaggtgttgctgggaggtgccgttggactcattcccgagatcgaccgacggaaatacagtgattcggggagacacacaccggagcgaactgatacaaacttcctgaacgagtttgagctacgcttgctcaatatgttcggattgaagcgaaaacccaccccaagcaaatcggcagtggtccctcagtacatgctggacttgtattatatgcactctgaaaacgatgacccgaacattcggcgcccgaggagcactatgggaaaacatgtagaaagggcagccagcagagcaaacacgatacgaagttttcatcacgaagaggctttcgaggcactgtccagcctgaaaggaaaaacaacgcagcagtttttcttcaaccttacctccattcctggcgaggagctgatctccgctgcggagctgcgcattttcagggaccaagttctcggagatgccagtacgagtggcttccacagaattaacatttacgaggtgttcaggccagctttggccccctccaaagagcctctaaccagacttctggacacccgtctggtgcaggactctcacacgcgctgggaaagcttcgacgtgggttcagctgtggcacgctgggcccgcgaatcccagcacaaccacgggctccttgtagaggtgctccatcctaaggagtcagaagtatccgaggaggctgagagcaaccggaggaagcacgtgagggtcagtcgttcccttcacgcggatgaggactcgtgggcacaagcccgacctctgctggtaacctacagccatgacggtcaaggcacagccgtcttgcattcgaaccgagaaaagcggcaggctcgacgagggcaaaagccgaggagaaagcaccaccagcgctcgaactgtaggcgacatgctctctatgtggacttcagtgatgtcggctggaacgagtggatcgtggcaccgccaggctatcatgctttctactgccatggcgagtgtccgttccctctgccggaccatctaaactccaccaaccatgccattgtccagacgctggtgaactcggtcaactccaacattcccaaagcctgttgcatcccgacggagctcagccctatctcactgctgtacctggacgagtacgagaaggtcattcttaaaaactaccaggacatggtggtggagggctgtgggtgccgatgagaacaatctccccaatgaagacttttatttatacaaaagagcgagctatttggaggaagaaaagaaatatatatgaatatatttatgttgaatgaacaaaacaaaaaaaaaaaaaaaaaaa

***bmp7a***

MO GCACTGGAAACATTTTTAGAGTCAT

Bmp7a 2’OMe ASO#1 (GC = 30%)

mG\*mG\*mA\*mA\*mA\*C\*A\*T\*T\*T\*T\*T\*A\*G\*A\*mG\*mU\*mC\*mA\*mU

Bmp7a 2’OMe ASO#2 (GC = 40%)

mG\*mC\*mA\*mU\*mA\*A\*C\*A\*T\*G\*A\*A\*G\*T\*T\*mG\*mA\*mG\*mU\*mC

>NM\_131321.2

gagaccgtcagttcaacctcagatcatgctggatgttgctctggattggattaatcaacacgtgtatggcatttaatacagactcaacttcatgttatgctcaaacgaaataatancaatacttcactaatcgattgtggacttctgcntaactcttgttattttttttaagaatat**ATG**actctaaaaatgtttccagtgcatcttatttccactttgatagtggcttgtggttgcagtgtgctcgcagacgcaatgcaagcaaacttcaccatggataatgacattcagtctagcttcatccagcggcgcctgaagagccaggagcgcagagagatgcagcgggaaatcctctctatcctcgggctgccgcaacggccacgtccgctcctgcacgagagacacaccgcggctcccatgtacatgctggatctgtataacgccatcctggaggacggagacnggcgcggtgggcttgtgtactcttatgaacccgcgtacacgaccccgggacccccgctggtgacccagcaggacagtcgctttctcagtgatgccgacatggtgatgagctttgcgaatacagtggatccagaagaagaccttcaactgtatcatcagcatcgcagagagttcagatttgacctttctcgcatcccgccaggtgaaactgtgaccgctgcagagttccgaatctacaaagactttgttcgcgagcgttatgaaaacgagaccttccatgtcagcgtgttccaggtgcttcaacagcagcacagaagggagctgtacctgctggactcacgagtggtatgggctgcagaagagggatggctggtctttgacctcacggtcaccagtaaccactgggttataaacccaggtcagaacttaggactgcagctcttagtggagacctcacatggtgcaagaatgaacccaagaagagctggcctggtgggcagcagtggagctcagaataagcagccgtttatggtggcgtttttgaaagcatcaggaatccacctccgcagtgtccgctcggcatcaggaggcaaacagaaaggtcatcaccgcactaaaaacgccaaacctggcgctgcacacagccaggtggctttgaaaacagctgaagccacagagggtgccagcatagatcccaaacagggctgcaaaaagcatgaactctacgtcagcttcagagatctgggatggcaggactggatcatcgccccagagggttatgccgcgtactactgtganggcgaatgtgtgttccctttgaactcttatatgaacgccacaaaccatgctattgtacagacactggttcatttcataaaccctgaaactgtcccgaagccctgctgcgctccaactcagctgcacggaatctcagttttgtacttcgatgacagctccaacgtaatattgaaaaagtaccgcaacatggtcgtcagagcctgcggatgccactaatcactacctctaccctcaccagngggattcaacaagggatttaaagacttgtattcttgattatcaagagcgcagagagaatacgagactcgctgctggacccaaactgganttcttcatatgaagcggataagacaaaactcaaaactcctagaacacagctgagtgtgtgttgtgtctggctttcatttctgcacagagagccaagtttaaaatatcaaaaaggacataagcagatncagagagaaaataaaagagatttaaccagactgatcagggaagatgcagtggatttaagcataatgctatcgtatttcataaaccacttgacttgatttctgaaagaataataccttttaaaaagtctgagaccaaagccgaatt

***chordin***

MO ATCCACAGCAGCCCCTCCATCATCC

chordin 2’OMe ASO#1 (GC = 60%)

mA\*mC\*mA\*mG\*mC\*A\*G\*C\*C\*C\*C\*T\*C\*C\*A\*mU\*mC\*mA\*mU\*mC

chordin 2’OMe ASO#2 (GC = 60%)

mU\*mC\*mC\*mG\*mG\*A\*G\*C\*T\*C\*T\*G\*A\*C\*T\*mG\*mG\*mA\*mG\*mU

>NM\_130973.2

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***ctnnb2***

MO CCTTTAGCCTGAGCGACTTCCAAAC

ctnnb2 2’OMe ASO#1 (GC = 60%): most efficient knockdown

mC\*mC\*mA\*mA\*mA\*C\*C\*T\*G\*A\*A\*C\*/iMe-dC/\*G\*G\*mA\*mG\*mA\*mG\*mC

ctnnb2 2’OMe ASO#2 (GC = 65%)

mA\*mC\*mU\*mG\*mC\*C\*/iMe-dC/\*G\*T\*C\*C\*A\*G\*A\*T\*mC\*mU\*mG\*mC\*mC

>NM\_001001889.1

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***cx41.8***

cx41.8 2’OMe ASO#1 (GC = 55%)

mG\*mC\*mU\*mU\*mU\*A\*C\*T\*G\*T\*T\*G\*G\*T\*G\*mA\*mA\*mG\*mA\*mG

cx41.8 2’OMe ASO#2 (GC = 35%)

mG\*mA\*mA\*mU\*mA\*A\*A\*A\*G\*C\*C\*T\*C\*T\*G\*mC\*mU\*mA\*mU\*mU

cx41.8 2’OMe ASO#3 (GC = 65%)

mC\*mC\*mA\*mC\*mA\*C\*C\*T\*T\*T\*C\*C\*C\*A\*C\*mC\*mG\*mA\*mG\*mG

>NM\_001034988.1

gccgttcggcctgctggcagctgcttctgatcatcagcgtgtctgtaatctttcgtcccacagaagagacagtgagcaggattcatctgagggaagattgattttttgaggtcaccgtctagaaaaacaaacacaatcggcagttcattcatcaagtccggctttatcgttgaaggagacctttcattttgtcaagcggagtaataaaaagtcaatttttggcattaatctaaggatgatattgacaacgagtgatctgtctactacaattcttgagtccaaagttcaatgctttaagaaaaatatctttaatcctgctgaggtgtcaacaaacctgcttggtctcttcaccaacagtaaagcatcaacagtctgactctgtccattcaggatctctaacctcaggcattaatcgcacaagcgttcatcaaagggaagcttcagctggagatccgaagtcttggaggctctgtgactgtcagactgccaagtggttctggcaacaaatcgcacatcctgaaagcagagtagaggagaagagctttcgggtaaacaagagtctgtcaagtttcatcactaaatagcagaggcttttattcatcggtcaacagagatagaaacacacacctgtcagatctcaaacagacacgtgctgctacgctaactggtttcaatcaggctcctctgaataggc**ATG**gccgactggagtctgctggggagctttctagaagaagtccaggagcattcaacctcggtgggaaaggtgtggctcactattcttttcatcttccggatcttggtactaggcacggctgctgaatcctcgtggggcgacgagcaggaagacttcacctgcgacacagagcagcccggctgcgagaacgtttgttacgaccgagcctttcctatagcgcatatacgcttctgggtgctccagatcgtgttcgtgtctacaccttctctgatctacatggggcacgcaatgcatatcgtccgccgagaggagaagaagaggaaagagctggatgatgaaggagcgcagagagatggagaaaagtacccagaagatgacaagaacaaggaggacgaaggtggaggtaggagggtacgattgaagggtgcgttgctgcaaacatacgtcctcagcatcctcatccgcactgtgatggaagtgatcttcatcataatccagtacctgatctacggagtcttccttagtgcactctatgtgtgtaaagcccctccgtgtccacatccggtcaactgctacatctccagaccaacagagaagaacgtgttcattgtcttcatgctagcagtagcagcggtgtcactgctgcttagtatcgtggaactgtatcatttggcatggaagcagttgaggaagtatgtgcacggatacaaggcttccaaacaacgaccaaacacgccgtccaccatgcctgcactttcaccaaatccgtccaccccaaaccgagcctgcaccccacctccagacttcaaccaatgcttgacctcgccaccatcttctcctactttacagacacactcgcttttacatccgacctgccctccatttcacgaccgactggcgcaccagcagaactctgcaaacatggtcactgaaaggcacagaggacaagactacttaggggtcaacttcttgagcttctcacagacacctacagagactcccaactcctgtgcctcaccttcattcctgagcagtgattttgaggacaagcgaaggtttagtaagagcagcgggaccagcagccgcatgagaccggacgaccttgcggtatagcactggccagtcatatgtggaaattgggttgttctattgtgactaaaggctgatttatacttctgcatcaagcgcatgcgtatgctccggtgcaaccttcatgcagtcgaatagcccttgccgtggctaacgcctctcaaaaaaatgtaactacatgtcacaacgattcatagcgcaagctctgcgattggtcagcttggtagtgctgacaagcatggatggtgctgagagccgtgagccatatgcagcgattgcttatgtaaccccaccggtcctacaccacccaacccgctccgagctgggagcgaaccggcgaccttccgcatgggagtcggttgctctaacaaggaggctaaagaccatggcctctagtgtctgtcgctagagcacctttagaggtcagaggagtgaggattacctgcacagcacacaatagctggcctctgttacactcacccccctaaacctcactcccatccgggtcacggcaccaatgtaaccccaccggtcctacaccacccaacccgctccgagctgggatcgaaccggcgaccttccacatgggagtcggttgctctaacaaggaggctaaaaaccatggcctctagcgtccgctgctagagcacctttagaggtcagaggagtgaggtttacctgcacagcacacactagctggcctccgttacacttacagttgtcaagccctacgaaggagctccaaatggaaacttttgttttgtgtttaccttatgattaatgttgttgcacgtccgccggttcccgcctctgaataggcaagttttagctacgtattttaagaaactgaacacagaggaacatgcaaacatactgccagctagcgtgtcagaattgttattgcagagcaacacaaacagcacacagaagtatatatgcacgactacgcatcaaggcaagcaccgcgctgttcacgcccatcactcaatcgcagaagtataaaccagccttaagcctcaaaaaaaaaaaaaaaaaaaaaaaa

***dnd***

MO GCTGGGCATCCATGTCTCCGACCAT

dnd 2’OMe ASO#1 (GC = 40%)

mG\*mG\*mC\*mG\*mU\*T\*T\*T\*A\*G\*A\*C\*T\*G\*A\*mU\*mG\*mU\*mU\*mU

dnd 2’OMe ASO#2 (GC = 55%)

mC\*mG\*mC\*mG\*mC\*T\*C\*A\*A\*A\*T\*T\*T\*C\*A\*mG\*mA\*mC\*mC\*mC

dnd 2’OMe ASO#3 (GC = 55%): most efficient knockdown

mG\*mC\*mA\*mU\*mC\*C\*A\*T\*G\*T\*C\*T\*C\*/iMe-dC/\*G\*mA\*mC\*mC\*mA\*mU

dnd 2’OMe ASO#4 (GC = 50%)

mA\*mA\*mC\*mC\*mA\*T\*C\*T\*C\*A\*T\*C\*T\*C\*T\*mC\*mU\*mG\*mC\*mC

acaaacatcagtctaaaacgccttgtcttaaaacaccttaagtgaaatttcctctgagggtctgaaatttgagcgcgtttcacagaatccgcccacttgctccaacagtccaatagcgtctctaggagtcatgaggtttcttttaatgaccttttcttgacttttccaccaatttacaggtgtgtctatcatcatcatcacag**ATG**gtcggagacatggatgcccagcagcaggagcttcagcagattctgaacccgcagaaactcaagtctctgcaggaatggatgcagaggaactccatcactttaacccaagtcaatgggcagaggaaatatggtggtcctcctccaggttggcagggtcctgctcctggttcgggctgtgaggttttcatcagtcagatcccgaacgacgtgtacgaggaccgcctgatccctctcttccagagcatcggcaccatttacgagtttcgcctcatgatgaacttcagcgggcagacccggggcttcgcctatgctaagtacggtgaccctcttacagcctcggctgccgtcaccacgctgcatcagtaccggctgccggaggggggctgcctgaccgtgcgcaggagcaccgagaagcgccagctgcgtttgggggatctgcccgtcagcatgaatgaatcgaagctgctgatggtgctccagatgctctctgacggtgtagaggacgtcctgctcaagccaccggggcccaaagggaaagaggttgtggctctagtcaactacacgtcccattacgccgcatccatggctaagaaagtgctcgtggaagcttttcggaaccggtacggcatttccatcaccgtcagatggacttccttctccaagtccaagcgcgtcgaggacactccccaggaagacagctgcgtaaccccacttgttctgaagccgctttctaaaccatcactcctgcattatgacgtcccagctcaccagtctctgcttcctctcttccgggctgttgggggtccgaccaccagtgagcagagagatgagatgattcctcaacccaccataatgtcaagaaatgagctgattcctcaatcgtccataaggcagagagatgagatggttcctcagctccccataaggccgagagatgggatggctccccaatcccccattagtctcgacgccgtgtctcatctgcagtggatgtgcgaggtcaacagactcggctctccgcaatatgaagtccacttccatcacgcggctcctgacggattcctctacttcgccttcaaagtgctgatcccaggcctgccgctgcccctgtatgggttcgtccagatcctgccaggcaccagcgcacgagccatgaagagtgaagtttaccgggccgccgctgagcaggtgatccaaaccttgtgccgagtctcaaatttacggcctttctaagaatgtcagattatggcttgatcgaatgtgattgtgatcagttttacgttcagtattatgtactgttccggttatagatgatgaatatgtggaaatgtaatgaaaaataagcatttagtttactgttgatgaagagaaaaaaaaaaggtgaccaaggcagtattacttttatttgattttatttttttcaagctcttgaatttagtggtttgaagttttatgttctcgtcgttttataatattttaactatgtaatattaataattgagttgttttagtcagcctcatcatattaggatgactgcatgttttcacgcttttcttttgagtgtttttcactgtatttcgacttcactttggtttgcgtttgtcacgattgttctttttgcatggtgtgctccttgtgtttccttgtttgatgggttgtactgactataaatgacttttgtacaataaataagttgtt

***hcrt***

hcrt 2’OMe ASO#1 (GC = 50%)

mG\*mU\*mC\*mC\*mC\*C\*T\*G\*T\*C\*T\*T\*G\*T\*A\*mG\*mA\*mC\*mA\*mA

hcrt 2’OMe ASO#2 (GC = 50%)

mC\*mU\*mU\*mA\*mG\*C\*T\*G\*T\*G\*C\*A\*G\*T\*C\*mC\*mA\*mU\*mG\*mA

hcrt 2’OMe ASO#3 (GC = 60%)

mG\*mC\*mC\*mA\*mU\*G\*A\*A\*G\*A\*/iMe-dC/\*G\*A\*G\*C\*mA\*mC\*mC\*mU\*mG

>NM\_001077392.1

gaaaatcaagacttttcgatacatgacatttgtctacaagacaggggacagaagctaaactc**ATG**gactgcacagctaagaagctccaggtgctcgtcttcatggcgctgctagctcacctggccagggacgcggaaggcgtggcctcctgctgcgcgcgcgctcccggctcctgcaaactctacgagatgctgtgccgagcaggacgcagaaacgactcttccgtcgccagacatttagtgcatctcaacaacgacgccgctgtcgggattctcactcttggcaaacgtaaagtgggcgaaagccgcgtccacgaccgcctgcaacaactgctgcacaactcacggaatcaagccgcggggatcctcacaatggggaagaggctggaggagcccgctaaattcctcatccctacggtaccacaggatgtggacagttatgaaaaacgatgacacttgtcgctatttaataaaaaaaaaaaaaaaaa

***mitfa/nacre***

MO CATGTTCAACTATGTGTTAGCTTCA

Mitfa 2’OMe ASO#1 (GC = 40%)

mC\*mU\*mC\*mC\*mA\*A\*C\*A\*T\*G\*T\*T\*C\*A\*A\*mC\*mU\*mA\*mU\*mG

Mitfa 2’OMe ASO#2 (GC = 45%)

mU\*mG\*mA\*mU\*mG\*T\*G\*C\*A\*A\*G\*A\*A\*C\*T\*mG\*mA\*mC\*mC\*mA

>NM\_130923.1 gccaagacgactggtcagttcttgcacatcacctaaattcacaaagggaatacttttttgaagctaacacatagttgaac**ATG**ttggagatgctcgagtacagtcactaccaggttcagacccacctggaaaccccctcgaagtaccacatccagcagagccagaggcagcaggtgaagcactacctgtccagtgcactgggagccaagctgagcccacaggccagcacagggcccggccccagccagcccgccgagcacggcatgaccccgggacccggagccagcgctcccaacagccctatggcccttctcaccctcaactgtgagaaagagatggacgatgtaattgaagacattataagtttggaatcaagctacagtgatgacattcttgggttcatggatgcaggacttcaaatgacaaacacgattccagtttcagcaaacctgctggacatgtacagcaatcatgctcttcctccagctggagtttccatcagtaactcctgcccctcaagcctgccggccgtcaaaagggaattatccgttactccatctccgggcatgatgcacattatggacaaagctggaccatgtggcaagtttgactcttatcaaagacctgatggctttccagtagaagcagaagtcagagccctggcaaaagagagacaaaagaaggacaaccacaacctcattgaacgaagaaggcggtttaatatcaatgacagaattaaggagctggggactttaattcccaagtcaaatgatccagacatgaggtggaataaaggcaccatcctgaaagcatcagtggattacattaggaaattgcagaaagagcagcagaaagcaaaagagctggaaaacagacagaagagactagaacacgcaaacagacatctcctgctccgtattcaggaacttgaaatgcaagcccgtgctcatggactcaccgttgtagcttcttccagcctttattccgctgagttagtggctcgagcaataaaacaagagcctgggatgggggactgcacatccaatttgtacccacaccttcccagtcctgacatgtcccgtcctaccactctggacctcaacaacggcaccatcagctacaatgacagtcccacggaggacggcgagccgggggtctacgacagcccaaacaaggcctccaccaagctggaggacatgcttatggacaacaccctgtctccggtgggcagcagcgacccgctgttgtcctccggatccccagtaccttccaacagtagcggcagcagcagtatggacgaacatgacaatggctgttagcaatgccaactaaatttcatgaaccaaagttagacaattagatttgtgtgtgtgtgtgtcttgtaagtaccagtgttacatccagatcatgaagagcgcaatttcgtaaagtattaatcttgtatttcagaatatttagtgtgcttgtgtatatattttttcatttatcatgtcagagtctagtcaagaatgaaaacgtgtaaacaattagttgatttttgaaggattctcgcggatgatataaagaggagcttgaataaaaaaaaaaaaaaaaaa

***oep***

Oep 2’OMe ASO#1 (GC = 55%)

mC\*mA\*mU\*mU\*mC\*T\*G\*A\*C\*C\*C\*C\*T\*C\*A\*mC\*mA\*mU\*mC\*mC

Oep 2’OMe ASO#2 (GC = 45%): most efficient knockdown; used for rescue experiments

mG\*mG\*mC\*mG\*mA\*A\*C\*A\*T\*G\*A\*C\*A\*A\*T\*mU\*mG\*mU\*mA\*mG

Oep 2’OMe ASO#3 (GC = 45%)

mG\*mA\*mU\*mC\*mA\*T\*T\*T\*T\*C\*T\*T\*T\*G\*T\*mU\*mU\*mG\*mG\*mG

Oep 2’OMe site1\_5’UTR (GC = 40%)

mC\*mA\*mA\*mA\*mA\*C\*A\*A\*C\*T\*/iMe-dC/\*G\*A\*T\*T\*mG\*mA\*mG\*mG\*mT

Oep 2’OMe site2\_5’UTR (GC = 45%)

mT\*mC\*mA\*mT\*mT\*C\*/iMe-dC/\*G\*C\*T\*G\*G\*C\*C\*A\*A\*T\*A\*A\*A

(ORF in upper case)

gtgagatggagatgttctaatggtgtttttgggatacgaaaacttacctcaatcgagttgttttggagtttattggccagcgga**ATG**ACGAGTCAACTGTTCGGGTTCTTGATGTTTGCTGTGATTATTTGTCAAGCTGTTTCACTCGAGTCAGGATGTGAGGGGTCAGAATGTGTGAAAGTTGGGGTTTCTGGAAAACCAAAGCAATACGCTGAATTCTTGAATAAATTTAACGAAATGAACACGCAAACGCCGCAACGTCAACACCGCAACGCCGAGGCAGCGTTACCGTTCGTTGGACTGACCGGAGTTGCCAAACAAAGCCGTACCTGCTGCAAGAATGGGGGAACGTGCATTTTGGGAAGTTTCTGCGCCTGTCCGAAGTACTTCACCGGCAGGAGCTGTGAATACGATGAACGCCTCAGGGATTGTGGTGTTATTCCACATGGAGAATGGGTTCAGAAAGGATGTTCGTACTGCAGATGTGGATATGGACTTTTGCATTGCTTCCCACATGTTTTCAGCAAAGACTGTGATGTTTTCAGCAAAGACTGTGATGACTCTCAGGAAGTTCGGTGGCACCGGTCGGGCTCCCTCAGAACACTGTCGTCTACAATTGTCATGTTCGCCACTTTTATTTTACACCGCCTGCTGTAAatgagttttcctaaagggatagttcacccaaacaaagaaaatgatctcccctgttgaacgcagaagaagatactttgaaaaatgctggcacttgacttccatagtaggggaaacattactatggaagtgaaccagcatttctcttttgtgcccaagagaaggaagcagctctcaaataggttttaaaccgttgaaggatgagtaaatgtgttcatttttgtgcgaactatccctttaacaaacagaaagcggttttattttagattttttctgtctgacaggttcgggca

***slc24a5/golden***

slc24a5 2’OMe ASO#1 (GC = 45%)

mC\*mA\*mU\*mC\*mA\*T\*T\*C\*A\*G\*C\*A\*G\*A\*A\*mC\*mA\*mC\*mA\*mG

slc24a5 2’OMe ASO#2 (GC = 45%)

mC\*mA\*mC\*mA\*mG\*T\*A\*C\*A\*G\*C\*T\*A\*C\*A\*mU\*mA\*mC\*mA\*mC

slc24a5 2’OMe ASO#3 (GC = 50%)

mU\*mG\*mU\*mA\*mA\*C\*A\*/iMe-dC/\*G\*C\*C\*A\*A\*A\*C\*mA\*mC\*mA\*mC\*mC

>NM\_001030280.1

gtaagccgcggcggtgtgtgtgtgtgtgtgtgttctccgtcatctgtgttctgctga**ATG**atgaggacagacgtgtttctccagcggaggaagcgtagagatgttctgctctccatcatcgctcttcttctgctcattttcgccatcgttcatctcgtcttctgcgctggactgagtttccagggttcgagttctgctcgcgtccgccgagacctcgagaatgcgagtgagtgtgtgcagccacagtcgtctgagtttcccgaaggattcttcacggtgcaggagaggaaagatggaggaatcctgatttacttcatgatcatcttctacatgctgctgtccgtctccatcgtgtgtgatgaatattttctgccatctctggaggtcatcagcgagcgtcttggtctctcgcaggatgttgctggagccacgtttatggctgcggggagttcggctccagagctcgtcactgcatttctgggtgtgtttgtgacgaagggcgacatcggcgtcagcaccatcatgggttctgctgtctataacctgctgtgcatctgtgcagcgtgcggcctgctgtcctctgcagttggtcgtctgagctgctggccgttgttcagagattgtgttgcgtacgccatcagtgtcgccgccgtcatcgccatcatctcagataacagagtttactggtatgatggcgcgtgtctcctgctggtgtacggtgtgtatgtagctgtactgtgtttcgatctgaggatcagcgagtacgtgatgcagcgcttcagtccatgctgctggtgtctgaaacctcgcgatcgtgactcaggcgagcagcagcctctagtgggctggagtgacgacagcagcctgcgggtccagcgccgttccagaaatgacagcggaatattccaggatgattctggatattcacatctatcgctcagcctgcacggactcaacgaaatcagcgacgagcacaagagtgttttctccatgccggatcacgatctgaagcgaatcctgtgggttttgtctcttccggtcagcactctgctgtttgtgagcgttcccgactgcaggagacccttctggaagaacttctacatgctgaccttcctgatgtccgccgtctggatttctgcattcacttatgtgctggtctggatggtcacaatcgtgggggagactctgggaatcccggacacagtgatgggaatgactcttctggctgcaggaaccagtatccccgacaccgtggccagtgtgatggtggcccgagaaggtaaatctgatatggccatgtccaacatcgtgggctcgaacgtgttcgatatgctgtgtctgggcctgccgtggttcatccagacggtgtttgtggacgtgggctccccggtggaggtcaacagctcggggctggtcttcatgtcctgcacgctgctgctctccatcatcttcctcttcctcgccgtgcacatcaacggctggaagctgaactggaagctgggtctggtgtgtttggcgtgttacattctgttcgcaacactctccatcctgtacgagctcggcatcatcgggaacaatcccatacgctcctgcagggactgaacactgctctacagcgcccccttatggacaacacaaggatgtgactctttataaccctctaaagtgcacaggttcattactgaatacaagaaaatagaactgcgagacgtcaactcaaaatacaagagaagtcaaagtgcgagatgtaaaaaatatatgcacataaatgaggataaactttttatttaatatgacaaaactgcataaagtctgatgtgaacactgctcaacagcgccctctcatggacaacacatggatctgactcttattaaccctccagagtgcaaatacactaacacaacgtaatataaccaagttaaaatggcaagatgtgaactcaaaatacaagaaagcagtcaagatgcccgacataacaaatgtgcattaaaatgtaagccct

***smad2***

smad2 2’OMe ASO#1 (GC = 60%): used for knockdown experiment

mU\*mC\*mC\*mU\*mA\*A\*C\*T\*G\*G\*G\*T\*C\*T\*C\*mU\*mG\*mG\*mG\*mC

smad2 2’OMe ASO#2 (GC = 65%)

mC\*mA\*mC\*mC\*mA\*C\*C\*T\*C\*C\*T\*G\*C\*T\*C\*mC\*mG\*mC\*mU\*mU

smad2 2’OMe ASO#3 (GC = 60%): also produces efficient knockdown

*mU\*mG\*mG\*mC\*mC\*G\*T\*T\*T\*T\*G\*C\*T\*C\*T\*mC\*mC\*mA\*mC\*mC*

>NM\_131366.2

gtcgtctgctgctgtaattcggctacagtgggaaggaaaatattgttttaaaacgacttttacccactcgcgaataatcagtttcgcacggattttacgccaccgctttattacggagaacgcttttcgtaggaagggtaacccctcacccccctttcctctcctgtttcctaaacatctatgccccctgccccctcataatcagcccagagacccagttaggaactttgggtctgttcctccccattctcctagcctccatctgtctctctaactccacctgcccagactgaccgctcatcggacaccccaagaaaaaaaaaaac**ATG**tcctccatcttgcctttcactccgcccgtggtgaaacgtctgctgggttggaagaagtctgctagtggttcaagcggagcaggaggt*ggtggagagcaaaacggcca*ggaggagaagtggtgcgagaaggcagtcaaaagcctggtaaagaagttgaagaaaactggccaactggacgagctggagaaggccatcaccacacaaaatcgcaacaccaagtgtgtcaccattcccagcaattgctctgaaatttggggactgagtacaccaaatacgatagaacagtgggatacctcaggcctttacagctaccctgaccaaaccagatctctggacgggcgtttgcaagtgtctcaccgtaaaggtctgcctcatgtcatctactgccgcctgtggcgatggcccgacctgcacagccatcacgagctgcgcgccatcgagacctgcgagtatgctttcaacctcaagaaggatgaagtctgcgtcaatccctaccactaccagcgggtggagacacaagttcttcctcctgttctcgtgccaagacacacggagatcctgactgagttgccacctttggacgactacaccaactccatacctgaaaacaccaacttcccaacagggatcgagccccccaacaattacataccagaaactcctccaccgggatacatcagtgaggatggggaggccagtgaccagcaaatgaatcaaagtatggacacaggttctcctgcagaactgtcaccaagcacactctctcctgtcaatcatggcatggacctgcagccagtgacttactcagagcctgcgttttggtgctccatagcttactatgaacttaaccagcgggtcggagaaacattccacgcctctcagccttccctcaccgtggacggcttcacagacccctccaattcagagcgattctgcctgggcttgctgtccaacgtcaaccgcaacgccaccgtcgagatgacccgaagacatataggacgaggagtcaggctgtattatattggtggggaagtgtttgctgaatgtcttagcgatagcgccatctttgttcagagcccgaactgtaatcagaggtatggctggcatcctgcaacagtctgtaaaattcccccaggctgtaacctgaagatcttcaacaaccaggagtttgcagcgttgctggctcagtcggtgaaccagggcttcgaggctgtttatcagttgaccaggatgtgcaccattcgcatgagttttgtcaaaggctggggagcagagtacagacggcagacagtgacgagcaccccctgctggatcgagctgcatctgaacgggcccctccagtggctggacaaggttctgacccagatgggctccccctccgtacgctgctccagtatgtcctaaacccagctctctgtcctctgcccaccccaaaacaatcacatcaagcgacaactcgaagaacaacaggcttacgatgcccccctcgctcctttctctttcatagtactcgtgagcctttcttctatcctcttctctatcctctcgacactgatgttcggacccgaacgcagcacttgctgtctcatcagcttcatgcacctttgattctctcttgttttctttcataaaccctcaatattaaatgtattagtagtagaaaaaaaaaaaaaaaaaa

***smad5***

MO AACAGACTAGACATGGAGGTCATAG

Smad5 2’OMe ASO#1 (GC = 45%)

mG\*mA\*mC\*mU\*mA\*G\*A\*C\*A\*T\*G\*G\*A\*G\*G\*mU\*mC\*mA\*mU\*mA

Smad5 2’OMe ASO#2 (GC = 45%)

mA\*mU\*mG\*mC\*mC\*A\*G\*A\*T\*A\*T\*T\*G\*G\*T\*mU\*mG\*mU\*mG\*mG

>NM\_131368.2

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***ta-T/ntla***

MO GACTTGAGGCAGaCATATTTCCGAT

Ntla 2’OMe ASO#1 (GC = 45%)

mC\*mU\*mU\*mG\*mA\*G\*G\*C\*A\*G\*A\*C\*A\*T\*A\*mU\*mU\*mU\*mC\*mC

Ntla 2’OMe ASO#2 (GC = 50%)

mG\*mA\*mU\*mA\*mA\*G\*T\*C\*/iMe-dC/\*G\*A\*/iMe-dC/\*G\*A\*T\*mC\*mC\*mU\*mA\*mC

>NM\_131162.1 gaattcccgctgtcaaagcaacagtatccaacgggatttagtaggatcgtcggacttatctcaagctttatttgatcggaaat**ATG**tctgcctcaagtcccgaccagcgcctggatcatctccttagcgccgtggagagcgaatttcagaagggcagcgagaaaggggacgcgtccgagcgggatattaaactttcgcttgaagacgcggagttgtggaccaaatttaaagagctcaccaatgaaatgattgtcaccaagactgggagacgaatgtttcccgtgctcagagccagtgtcaccggtctcgaccctaatgcaatgtactcggtcctgctggattttgtggcggccgataataatcggtggaaatacgtgaacggtgaatgggtgcccggtgggaaacccgaaccccaaagcccgagctgcgtctacatccacccggactcacccaacttcggcgcgcactggatgaaagcacccgtatctttcagcaaagtcaaactctccaataaactcaacggaggaggacagattatgttaaactcattgcacaaatacgaacccaggatacacatcgtgaaagtcggtgggattcagaaaatgatcagcagtcagtcttttcctgagacacagtttattgcagtcacagcatatcagaatgaagagattaccgctctgaaaatcaaacacaatccttttgccaaagctttcctcgatgccaaagagagaagtgaccacaaggaagtcccagaccacagcactgacaaccagcaatctggatattcacaactcggtggctggttcctgcccagtaacggccccatgggccccagcagcagccctcctcagttcaatggggcccctgttcactcctcgggttcgtactgtgagagatactccagcttgaggaaccacagagctgctccatatcccagccattactcccaccgcagcactaccaccaataactacatggacaactcttccggaagtcttgcgtctcatgacagctggtcagccctgcagatccccaactccagcgggatgggaaccctggcccacaccacaaacactacctccaacaccagtcagtacccaagtctgtggtcagttgcagggacgactctcaccccatcaggctcagcatcgggctccattacaggtggcctgacatctcagttcctacgcggttcttcgatgtcctactcgggtctgacctcctcgctgcctgtgtcctctccctcctcaatgtacgatccaggcctaagcgaggttggcgttggagatgcccagttcgagagctccatcgcccggctcacagcatcatgggcgcctgtggctcagagctactgagatcgcttcacatttaaggactgatgctgcagttatggacttgatcttggcttcaggaggaaatctagaagagcttcttgatttgacaatcagaaaacgggttgatttactataaaagtcacatctgtatcataccgaggcatacgtatttacaatcaagatgagagacaatcaattaaagggttagttcttgcaaaaaagaaaattttgacatcatttactcacctttgttttaaacattgttaagtttttattctgttaaacacaaaagaagatattttgaagaatgttcaaaactggtaaccattgcatagaagctgttttacttatggaagtaaatggttacaggttatcagcatttttttaaatatattttttagttcaacagaagaaagaaactctttaaagtttggaacaacttgagggtgagtaaattgagtaaaagtacgtttttgggttaactatccctttaactatcagattttagccatacattttggggcaattatagtgtttattcttgataatattatctaaaagattaataaaatcaaaattgtgctgttgactcactaaaagtgtatatgtgtgtaaataaatagaaattaacgtccggtttcattgtatcacagaagaatgtaacagtcttacatgtgctttctgtagaacgagagaaagacagactttgctgtttcgtttgagaaagtgaatacgctttgaaaagtgaccgtatagttttgtctgctattcgtcctatagagaaaccatttgtacatatctatctatttgtatttgttgggctctttgagttttatttatgtcattttaataataaattaaatttcttttttttttctgtcaaaaaaaaggagttccggaattc

***toddler/apela/ELABELA***

toddler 2’OMe ASO#1 (GC = 40%)

mG\*mA\*mG\*mU\*mU\*A\*T\*A\*T\*A\*G\*A\*A\*G\*A\*mC\*mA\*mC\*mG\*mC

toddler 2’OMe ASO#2 (GC = 45%)

mU\*mU\*mG\*mA\*mG\*T\*G\*A\*T\*G\*A\*G\*T\*T\*T\*mG\*mC\*mA\*mG\*mC

>Zv9\_00001691 (Pauli et al., 2012; Pauli et al., 2014)

cctcccctttctcttgtctgtataaagagggggtgaaactacattgtctcaactgaacattcccactcatcaggtcatctgtctatctatccatccctcagaggacagagagagaagagagagtgaatatcgccctctcaaactttgaaaaagttggagagaccgagagctggctacaactgcgtgtcttctatataactcaacttatatgagatctgagaacacttgctgagagcgacagacacataagaggatttctacagtccgttacctgcacatccgacagaatttatcgtctgaggaaccgcggacatcctgtgaggagagtcgagtctgcgccgcggaccaaaccaccctgagcatcacc**ATG**agattcttccacccgctgtatctgctgctgctgctgctgacagtgctggtcctcatcagcgcagataaacatggtacaaaacacgattttctcaacttgaggcggaaatatcgcagacacaactgcccgaagaaacgctgtctacctcttcactccagagtacctttcccttgaggttttatgatgctccgggcaagcattaagaaaaaccaaagaccagccttggattggaaatgagagaagatttatgtcagatgtgccgaggactgttttattcgcacatgtattgtaatcaaagccatgtttgtctcttctgtagcagaagtgttttttgttttgttttgttttttaaatgaatgtaagtgaatgagccatggagatcctactgctgccaaacatgctgcaaactcatcactcaatcaggttgagttggagcagaatcattgtaaatagtaaggactgaatgaaatgtgtttatatgtaagttatgcacttcaaatgttttattattatcttgatttattaaaagtgtattgtcttttcagatgggtttagtgtgccttattgatttactacttgccatagaacatagctatagaatttacaaagtggcaacatggtggctcagtggttagcactgtcgcctcacagcaagaaggtcgctatcccggctgggtcagttggcatttctgtgtggagtttgcatgttctcccagtgttagtgtgggttttcttcaggtgctctagttttctccagagtcaaaagacaagcagtacaggtgaattgaataagctaaagtaaagtttcacaaactaatttccagagggac

***tolloid/mini-fin***

MO GCAGAGTAAAGGTAGTCCATCTGAG

tolloid 2’OMe ASO#1 (GC = 45%)

mC\*mA\*mG\*mA\*mG\*T\*A\*A\*A\*G\*G\*T\*A\*G\*T\*mC\*mC\*mA\*mU\*mC

tolloid 2’OMe ASO#2 (GC = 50%)

mA\*mG\*mA\*mG\*mG\*A\*T\*A\*C\*C\*A\*G\*C\*T\*C\*mA\*mC\*mU\*mC\*mU

>NM\_131010.1

cgttaatctctagggaaatgggcacgtttggaataagcggtaccagtcagctagcgcactctaatattccagtggctgtagaaaaagtgtttccagagagagagagaagagagagggagggagagagagggaatatgagggcagtactcaggatgagcctgcgctttgaggctgtaaaacactagaccctgagggcattctctgtctgagctgtgcctcttcaggaaaactgactgcgcaagagaaaggaagagtgagctggtatcctctgtagttgtaggttcatattgatgcatttggcgtccagctgagatgccgcgacgctgacggtcctgccccgtctgtcgaaccggaccaatgatgataatgaaggcgatgatgtccacacggcgcgtgtagccgcctaaattccacactgccggactcctaccagacactccttctgacccacgctcgttcacacctcag**ATG**gactacctttactctgcactcaccagtaaaatgaattggatcgcactcctgctggccggcttgactttttgttgcaaagtgtccgtgcacagctgtttagactacgatgacagttatgattattacgaggaggagaaaacagagacgatagactacaaggatccctgcaaagcagctgtattttggggagacattgccttggatgatgaggacttgaaaatgtttcacatcgatgggacgatagaccttaagcaacaaacacatgggaggcaaggacacacatctggaggtctaggagaacatgtgcccactaagaagaggggttccttatatctgctgctagacagaatacgacggttaggttttgagtcgtggccagtaaacagcagtaaagatgtgtcaagcataaagactggaataaggagagtaaacagcgccagaaatgtaaagtctcgagtcccacgtgctgctacatcccgagctgagaagatctggcctggaggagtcatcccttacgtcataggaggcaacttcaccggaagtcagagggccatgttaaagcaagcaatgagacactgggagaaacagacgtgcgtgactttcattgagaagactgatgaggagagctacattgtcttcacgtacagaccttgcgggtgttgctcttatgtcggccgccgtggaaatggtccccaggcaatatctatagggaaaaactgtgacaagtttggcattgtggttcatgaacttgggcatgtgatcggcttttggcatgaacacacgcgacctgaccgtgacgatcatgtgaccatcatccgggacaacatccagccaggtcaggagtataacttcatcaagatggaaccaggggatgtcaactctcttggtgagccgtatgattttgacagcatcatgcattatgccagaaacactttctccagaggaatgtttttggacacgattcttccctctcgtgacgagaatggcgtcaggcctgctattggtcagagaaccaggctcagtaaaggggatatatcgcaagccaagaagctgtacagatgcccagcatgtggcgaaacactacaggactcagtggggaatttctcatctccaggatatcctaatggatacccatcatatacacactgtgtatggaggatctctgtcacacctggggagaagatagtgttaaacttcaccactatggacctctacaagagcagcctgtgctggtatgactacattgaggttcgtgacggatactggagaaaagcgccattgctgggccggttctgcggtgataaaattccagaagttctggtctctacagacagtcggatgtggattgagtttcgaagcagcagcaactgggttggaaagggatttgcagcagtctatgaagcaatatgtggaggggagatcagcaaggactctggacagattcagtctccaaactatccagatgactatcgcccatctaaggagtgtgtgtggaggatcacagtgtctgagggctacagcgtgggcttaagctttcaggtttttgagatcgagaggcatgacagctgtgcatacgactatttggaggttagagatggattgtcagagaacagccctctgattggtcgattctgcggctatgataaacctgaagatattcgttctacctctaacaacctctggatgaaatttgtctctgatgggactgttaataaagcaggctttgctgcaaacttcttcaaagaggaagacgagtgtctgaagccagataatggaggctgtgaacagagatgtgtgaacacattaggaagcttcaaatgtgcatgtgatcctggatatgaactggctcctgacaagaagagctgtgaagctgcgtgtggcggtttgttgactaagttgaatggcacaattaccaccccaggctggcctaaggaataccctcccaacaaaaactgtgtgtggcaagtagtggccccgactcagtaccgtatatccatgcagtttgaagcatttgagctggagggaaatgaggtgtgcaagtatgactatgtcgaggtgcggagcggcttgtcatctgactcaaaacttcatgggaaatactgcggcacggaagttcctgaggtcatcacctcccagtacaacaacatgcgaatcgagttcaaatcagacaacacagtctccaagaaaggcttcaaagctcatttcttctccgataaagacgaatgttcaaaggataacggtggatgccagcatgagtgcatcaacactattggcagctatgtgtgccagtgccgcaacggcttcatcctacatgagaacaaacatgactgcaaggaagctgagtgtgagcacaaaatccacagcacgactggaaccatcagcagtccaaactggcctgacaaataccccagcagaaaggagtgcacgtgggacatcaccgcaacccctggtcaccgggtcaaaatttcttttaatgaatttgagattgagcagcaccaggaatgcgcatatgatcacctggaggcctttgacggcgattcagacaagactcctatactgagtcgcctgtgtggcaataagattcccgaaccactcatttccactggcaacaagatgtatctgcgtttcatctccgatgcctcagttcaacggaaaggctttcaggccactcattccaccgaatgtggcggaaggctgaaagcagaagcacgacagaagaacctgtattctcatgctcagtttggagataataactaccccggacacaccgactgcgagtggctcatagtggcagagtcgggttatggcatcgaactcaccttcaccacctttgaggtagaagaagaggcagactgtgggtacgactacatcgaactttacgatggctacgacactggagcgcacaaaatcggacgcttctgtggatctgggcctcgtgaggagctttactctgctggcgatgctgtgttgatccattttcactctgacgacaccatcagtaagaaaggctttcacatccgctacactagcacaaagtttcaggaggcgctacacacacgcaagtaacatttgagagactgaagacagggataaaatgaggagaaaaagactccagcaaactattgcaattgattcatttcaatcaaagaccctgccgttatgtgtttcctgcattggatttgcctctatgttcagccactatggaagtgctgtcatattgaccctaaacaccaatcagctgctcttatgtgtgggattgctccgcccactggagtggtgtcttgcgctctctgactggagcagtgcagtgaaaacacacacacacaatcacacacaaaactttcttgttggctctccattcttcagacatcgagttgcacactgaaactaagagacactgataataagacatttaagtaactgctattgaacgggcctgtgtgtatgtgtgtgtgttgctccggacagcatggacagtttggctgctgacgccacaccacactgtacctcagctaaaaatgtgtgtgtgtatttggatgtgtgtgtttgagagaaaaacagaaagagagagagagagagccttcaaataccagcctgaactcattcaaatgttttttttattgtggttgtacaattcttctgttattgttctgttagctttacggcaaaacccattttctctccatcaaaagtgcaaaagtaaatatgtagccctatttaacaataagcttccttacatgtatgtagcccattgtttatgtcagcggagacagacatcatttgtcagtgattaacattgagctggagggtctcattcactaagtatctgcatgcatcaaccggtgagggaaatttcaaccccatttctgaaaatgtacctttatataacatttctggagagcgccaaatacgtcccaggagctacgtttttgtcagtttttgtttttgcgaatccccagaggctgctgtgtatgctttttgagatcttaaatttctctcacatgccattcacacctgctgttctcttgtaaatccaccagagcccgctgttgactgactttctggctgaccaatcaacttgacccaccctcctcctttcctaaacctaaccaatagtattttaaaaagcacagattgacctgcccacccacttccctaaacg

***wnt11***

MO GAAAGTTCCTGTATTCTGTCATGTC

Wnt11 2’OMe ASO#1 (GC = 40%)

mG\*mU\*mU\*mC\*mC\*T\*G\*T\*A\*T\*T\*C\*T\*G\*T\*mC\*mA\*mU\*mG\*mU

Wnt11 2’OMe ASO#2 (GC = 45%)

mU\*mC\*mC\*mA\*mC\*A\*A\*/iMe-dC/\*G\*G\*T\*C\*A\*A\*G\*mA\*mU\*mA\*mC\*mA

>NM\_001144804.1 tcagacagtccgtggtgtatcttgaccgttgtggaaaaacttcactggagtttctaaacagcaaaagagcgac**ATG**acagaatacaggaactttcttctgcttttcatcacgtcactgagcgtcatttatccatgcacaggaatatcatggcttggtttgacgataaacgggagctcggtgggctggaatcagacgcaccactgtaaacttctggacgggctcgttcccgatcagcagcagctctgcaagcgcaacctcgagctcatgcacagcattgtacgcgcggccagactcaccaagagcgcgtgcacgagctccttcagtgatatgcgctggaactgctcgtccatcgagagcgcgccacacttcacccctgacctggccaaagggacccgtgaggcagcgtttgtgttttctctggctgctgcggtggtcagtcatgccatagctcgtgcctgtgcatctggagacctgcccagctgttcctgtgctgcaatgccgtcagagcaggcggctcctgatttccgctggggtggatgtggagataaccttcgctacggcctacagatgggctccgctttctcagatgcaccaataaggaaccggcgctcgggcccacaggcctttagactcatgcagcttcacaacaatgctgttggcagacaggtgcttatggactctctagagatgaagtgcaaatgtcatggcgtttctggctcatgctctgtaaagacctgttggaagggtcttcaagacatcagcaccatctccgccgacctcaagtctaaatacctgtcggccaccaaggtgattccgcgtcagattggcacacgccggcagcttgtgccccgagagatggaggtgaggccggttggagagaatgaactagtctacctggtcagctcaccggattactgcacacagaacgccaaacaggggtcactggggaccacagacaggcagtgtaacaagacggcgagcggcagtgagagctgtgggctgatgtgttgtggacggggttataatgcctacacagaggtgctggtggagcgctgccagtgtaaataccactggtgctgttacgtgtcctgcaaaacctgcaagcgcaccgtcgagagatacgtctgcaagtgacagaccgtcttcaccaatagaccttgtgtgaccctttttttttagagccataagtgagtggataatcctttcccaggcaggaaagtggagaaagaagagccggagttgaggaatatgggatggtgaaagagttaatgaatggctgtagacaaagaaccctgcagtgagacccttcaggctccccaccgaaaaccagagataagtagaggcaaaactcatcaactccggcactgaggggaagagactgggggaagggactgtgctgggaagacacttactttactgtggtaaaacttcacgcgttgatggcctgcccggatcggttttgttttggtcagatgaatttcacgagctggacgtgatggacatcagattagttcggttgacgtcagatgttctctgcactcagtattgatttatgaaaggttgacgacactatttttatagtaaagtaacttacagcaataggacaaacgagactgcttggaaattaacaacttctagttgtgtgtttgagtaaaaaatagttttgttttgcaaaatactgatgattttgtagtcattcagagcagaaaatgattatgatattttaaattgttttaaataacaaaaaaaaatgccatgtgtatgttaatttttccaatattttaatttcagataagtcattacagtggaataccctggatttgtagacactttgttattctgaccagttgtcatttagagagagaaaaaaacactgtaaatgaccatatttaatttctcaaattacagaataattttgatattaacattttactcaagcacataaatagaaaaaaaaactgtttgaaaaacatttttccatagctatttttgtgatgtctattaatattttcattgcattcataaaaagaaaaatgaaagccatgcatttcagcctgaaaaaaaacttgtacattgtctgtaaaaaatgaaaatttgtatttattttattaaaatatttaatgcaaaaata

***wnt5b***

MO GTCCTTGGTTCATTCTCACATCCAT

Wnt5b 2’OMe ASO#1 (GC = 40%)

mU\*mG\*mG\*mU\*mU\*C\*A\*T\*T\*C\*T\*C\*A\*C\*A\*mU\*mC\*mC\*mA\*mU

Wnt5b 2’OMe ASO#2 (GC = 50%)

mU\*mG\*mG\*mU\*mU\*G\*A\*A\*C\*A\*G\*C\*T\*T\*G\*mU\*mC\*mC\*mG\*mU

>NM\_130937.1

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***MALAT-1***

MALAT-1 2’OMe ASO#1 (GC = 45%)

mU\*mC\*mC\*mA\*mC\*A\*C\*A\*A\*C\*A\*T\*C\*C\*T\*mG\*mG\*mA\*mA\*mU

MALAT-1 2’OMe ASO#2 (GC = 55%): used for knockdown experiments

mA\*mG\*mC\*mA\*mU\*T\*C\*A\*G\*G\*G\*A\*C\*A\*C\*mU\*mG\*mC\*mA\*mC

MALAT-1 2’OMe ASO#3 (GC = 30%): also produces knockdown

mU\*mG\*mA\*mT\*mA\*C\*G\*G\*T\*T\*T\*G\*A\*T\*T\*mU\*mA\*mA\*mA\*mG

>Zv9\_00034242 (MALAT-1; Pauli et al., 2012)

gacgaggcaacaacattgtgcgtcacgacggggtgaggcgctatggaaggcagggaggcttcgttgatctggtgaaatgttcttattttgttctgtttaattttttgataactaataggcatttttatttacaaacctttaaagtcttaaaactctagacgttttccgttggttatacaaaggttttcttttgagtagcaagcgtgacgaagataaaatacaagcttacttttcacttaaataggtaacttagaagtgcctttatgagaaaaaattcattttttgtttatcttaaaaagacaaaaaacgtcttatttagtcgaacatttaacgtttatcttcaggttaatgtttaactagcttacgttaccgaaagcctaaacaaagctcgactgtaaatggctaagcgaacgttatccttttcacttaacctcattttaagcttatttttgtttcagcaagggttttctgaaattacgtgattttatacacttatttttttgacgcttgtttagtttgattctcgacgctagaaagaatttacaaaatggcggtcgcgacgacggattagatttcgttgaagaaaagctgttatgatttctcttttgttttcaagtcagaacaaccaataacagtttatataaacctatagagttatattagaccaacgttatatacagacctacattttattatttatttttctttttacaataccgattagtaacagccttttatggtaacagtaaggacccagggtatctacaaccattttaacttgtaaattttcaaggaaaaactttttgtttctttttttatcttcagaccataacgagtaatagcagccttttatggtagtgaggtcaaacagcaagtcttttttttctatcttgatattacgattagtaagttgacccatttagcaaggatgaacttaaaagcaaccagtttaaattagatggagggtaaacgactacaaggttacagtagattttacagtagaaaaaaaaaattcatttttttgtcatttaggttgactagcaaaaccactaacgaccatttcagtacagcaaggaagagcatatttaagctacagactttcttaaaaaaatatatattttagtatgcctgccataacttgaaaatcaattacaacttatatttcatttaaaaaaaaaaaaaagtattttcttttaatataccgcaagtccattgcaacttaattatgatggcaaacattttaaaaatgtatttctttttattataacagccataacaaatgttacaagtttattatggtagtaaacaaaaaaaatctttttaatatgccagctataatgtaaatgtgttacaacttcattatgaatccaaatcagttttattaaaacaaagcagctgcttttgttaaaaaaaaaaaaaaaacagcagagattaaataaaccgatctacaagactagatttttctaaaatctgaaagaacagtctagaactgccaatgagatagaggattaacacagtcaagactgcagtagattttcttaaaccagttttgtttttacaattttaaccttttaatggtcaggataaaaaaaaaaaacactattactgaagatttcagttttctttttagtttgcatacacttaaggtatagtgagggcaaaccatcattgctatgttgtaaatctcattttattttaaacagtcatttatttatttttttacccgttttatatacagtagtacaaataaataactacaatctaaggctacagtagatcttaaagttattttgcttgtaaactattacacaataataaccacttaagtagcaaaaacagcctactggagatttaaaaaataaaaaaaaaaagaactttttctccaacccaaaacttagcggcttatatgatagtaagggtgaggttgtccacagtagaagtcaacagtagatttttatttattttcttttgggaaagaaaacttttaatttagtatttcagtctcttgactaattatagagggtatcaataattagtcaagattactttttttttttttttaaactacaatagaacagtttacgttaccaagaatgcagtatttacatttttatttgtttatctgcaaaccttatccaagaaatgaggaacagcttctgatagccagagtgccatttttaagagattttattttgttttttgcataccataacagaacaatcaccaacgcttaaagccaaaaaaaaaaagccagacaattttttgaaaactacaatagaacagtttacgttaatcaagaatgcagtatttacatttttatttgtttatctgcaaaccttatccaagaaatgaagaacagcttctgatagccagagtgacatttataagagatttttattttgttttttgcataccataacagaacaatcaccaacgcttaaagccaaaaaaaaaaaaaaaaagccagacaatcagatgtaaaagtctttttaaatattacttttgaaaaaaaaaaaaaaaagcctgctcttgttgcctattaggaagaaattactgaacatcaagtgagtgtttttagtttggaagacaacgattatagatgctgcctcctttttttttctttttttttttttcttttttttttttgagaagaagaagaattgagtatttcaagatttaaatttgcaagcctagaagaatcaatcaacaatgatgctttttttttctactgaaccacgtaattgattgctgtatggactgagtcatgttgagtaacagcagtgaaatggaagcgtaggttgttttcatgatccaaagatatcagcagaagacggatgtgcagaggacaggagaaatggactgagtttatccagtaacaacatagctcttagatgacgtcggatggaagaaaaagatctacagcagggaccagggagaatcaggacaagaaaagatctacagcaggggccaggaccagggagaatcaggacaaggtggcgagccaggcagaaccaggggaggatcagagggcacagatcagggtgaagcgcagcagtatccagaagggggagccgggtctacaaggcagagtagcttcagatccacgttgaccaccagggggagctcagctggtctagatcagagcaagccaaagatgggtgtcccaaaagcagcaggagaaagagggctcacaagcagagggtatcaggggtcgttgccatagcacagtcatgaggagggcatttggtttgtatgggttgaggtattctgtgtaacttaagtcattatttcagtttgtattccagaaccctttgctcgcgaagttctgttctttccttttcaggcgtggtgaatgaatgtttgaaaatccgatatggcatctgtcccgttgttggccaagtctgatgaatgccgttagtgtgctgcggagacgatcgtccttattcgaccacgcctccgctgagatttggctataggcccgtggaaaagtcgtcccccatatccgcttaaatccattaggtctgtcctgagaagcaatccacgttcgaagggtttttcggagttgatgttcgactgcgtccctacacgacaccactacctctactgcaacacccgctgcgtcagtccaacatatgatgccagggcagccgcatattgcctgccggtaaaattttgatgagttcatgcatgaatttttattgtaatttagagcaaaagctttgtatatttaaaaaaaaaaaaaagaaaaaaaaaagaaaagagaaaaaatatatacaatacgtttttgcaaaagtaaatgcgttattgtaaaattattaacatacagatgttgcaaatgcactttctgagtagttatgtaatgttattgcagtgtttttggggtttgggaggggcaaattcgtttctcgagttctctttcccacaggccctgttcacattagaggcgataaaaccaaaaagggattccaggatgttgtgtggacccttttagagtcagtttgacttccctgtaaagaattctttaaaagcttcaaggaaagcctctgatttaggaaggtaccccattggatttgttttaaagtcttgtttggaatcatgaactatacatttatcaatattttccagtattacatgttgggatttgcaatggggtgggaggggtgtgggtcgttaacccaaatcttttcctagactttgcagcttgtgaaagcggctttattaagggtggcaatggcttgaatagcgcagtatggggaaggaaccaccagtgtgtctgccagtggatgcgtggccctgttacaagccttccatggcagctagaccaacgtttacatgggtaacgcggcatgggatcaaacgctttcattttatttaacacatcattatggccattttcctatcattattgaattggtgtttggatattggttgtgtatttggatattgtttatggggtttgtggatctggggggggggattgcctaattttgactcttacagattgaaacaaacccttaaagaacaaagctggtggtccaaccaatatctgctccacttcccccacttgagcaaagcttcttcgctagaggtccagatgcttttaacattttctaatggcaagtaattgtgggtattcatgtaaatggcattcatttgcttttgtctgtcgttgtattgtacttgaatacaatttgatggctaagtgtaagcagtaactgtattagttgcttatttgtctttttaatttgtgtattttgaaaagcggggatgtgtgtaggctttcttttcctccccctctgcatttttcagtgtgcagtgtccctgaatgctttcaaccgaagatgtcatcctaacattgtttgtaaagatttgctttcgcatcaagcaacttcagcctcttttcggtcacgtaaggtcactaagcaagtccatttgtttctaaccttttccatttttaatagtctgttacaacctgtaaaatgtgtggtcgcacacttatt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***miR-126***

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MO2 GCCTAGCGCGTACCAAAAGTAATAA

miR126a 2’OMe ASO#1 (GC = 50%)

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miR126a 2’OMe ASO#2 (GC = 55%)

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