ACTIVE MOTIF®

Enabling Epigenetics Research

MicroRNAs & HUMAN DISEASE

publications highlighting current research identifying the associations between miRNAs and disease

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MicroRNAs & Human Disease

MicroRNAs (miRNAs) are a class of small non-coding RNAs which normally function as post-transcriptional regulators that inhibit target mRNA expression. miRNAs associate with the 3´UTR of target mRNAs where they induce cleavage or translational inhibition of target mRNAs. There has been a growing increase in reports associating miRNAs with human disease. However, the regulatory networks governing miRNA-disease associations remain largely unclear. In order to further our understanding of the associations between miRNAs and human disease, innovative tools are needed to identify novel disease-associated microRNAs and to study their regulatory functions.

Active Motif's LightSwitch™ 3´UTR and miRNA products are ideal for performing miRNA target validation, as well as assessing the functional impact of miRNA-3´UTR interactions. These include a collection of over 12,000 3´UTR constructs, miRNA Mimics and Inhibitors, and over 900 optimized LightSwitch Synthetic miRNA Target Reporter constructs to ensure you have everything needed to validate miRNA targets, measure RNA stability, translation efficiency and the functional impact of miRNAs.

To also aid in the introduction and understanding of miRNA-disease associations, this reference piece presents a selection of recently published articles featuring the use of LightSwitch products for disease research. For more on the LightSwitch Luciferase Assay System and products, please visit us at **www.activemotif.com/lightswitch**.

ONCOLOGY

Agrawal, P. *et al.* (2014) Mapping posttranscriptional regulation of the human glycome uncovers microRNA defining the glycocode. *Proc. Natl. Acad. Sci. U. S. A.* 111, 4338–43.

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Hamilton, M. P. *et al.* (2013) Identification of a pan-cancer oncogenic microRNA superfamily anchored by a central core seed motif. *Nat. Commun.* 4, 2730.

Selcuklu, S. D. *et al.* (2012) MicroRNA-9 inhibition of cell proliferation and identification of novel miR-9 targets by transcriptome profiling in breast cancer cells. *J. Biol. Chem.* 287, 29516–28.

Tang, X. *et al.* (2014) Glycogen synthase kinase 3 beta inhibits microRNA-183-96-182 cluster via the β-Catenin/TCF/LEF-1 pathway in gastric cancer cells. *Nucleic Acids Res.* 42, 2988–98.

OBESITY AND DIABETES

Cifarelli, V. *et al.* (2015) Metformin and Rapamycin Reduce Pancreatic Cancer Growth in Obese Prediabetic Mice by Distinct MicroRNA-Regulated Mechanisms. *Diabetes.* doi:10.2337/db14-1132.

Clarke-Harris, R. *et al.* (2014) PGC1α promoter methylation in blood at 5-7 years predicts adiposity from 9 to 14 years (EarlyBird 50). *Diabetes.* 63, 2528–37.

Jenkins, Y. *et al.* (2013) AMPK activation through mitochondrial regulation results in increased substrate oxidation and improved metabolic parameters in models of diabetes. *PLoS One.* 8, e81870.

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Yang, M. *et al.* (2014) Identification of miR-185 as a regulator of *de novo* cholesterol biosynthesis and low density lipoprotein uptake. *J. Lipid Res.* 55, 226–38.

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Kelly, C. J. *et al.* (2013) Fundamental role for HIF-1α in constitutive expression of human β defensin-1. *Mucosal Immunol.* 6, 1110–8.

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Lill, C. M. *et al.* (2014) Assessment of microRNA-related SNP effects in the 3' untranslated region of the *IL22RA2* risk locus in multiple sclerosis. *Neurogenetics.* 15, 129–34.

Pham, D. *et al.* (2014) The transcription factor Etv5 controls T_H17 cell development and allergic airway inflammation. *J. Allergy Clin. Immunol.* 134, 204–14.

Xu, N. *et al.* (2013) MicroRNA-31 is overexpressed in psoriasis and modulates inflammatory cytokine and chemokine production in keratinocytes via targeting serine/threonine kinase 40. *J. Immunol.* 190, 678–88.

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Chao, C.-H. *et al.* (2014) MicroRNA-205 signaling regulates mammary stem cell fate and tumorigenesis. *J. Clin. Invest.* 124, 3093–106.

Dolezalova, D. *et al.* (2012) MicroRNAs regulate $p21^{Waf1/Cip1}$ protein expression and the DNA damage response in human embryonic stem cells. *Stem Cells.* 30, 1362–72.

Egea, V. *et al.* (2012) Tissue inhibitor of metalloproteinase-1 (TIMP-1) regulates mesenchymal stem cells through let-7f microRNA and Wnt/β-catenin signaling. *Proc. Natl. Acad. Sci. U. S. A.* 109, E309–16.

Fang, X. *et al.* (2014) The zinc finger transcription factor ZFX is required for maintaining the tumorigenic potential of glioblastoma stem cells. *Stem Cells.* 32, 2033–47.

Karlsen, T. A. *et al.* (2014) MicroRNA-140 targets *RALA* and regulates chondrogenic differentiation of human mesenchymal stem cells by translational enhancement of *SOX9* and *ACAN*. *Stem Cells Dev.* 23, 290–304.

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Morgado, A. L. *et al.* (2014) MicroRNA-34a modulates neural stem cell differentiation by regulating expression of synaptic and autophagic proteins. *Mol. Neurobiol.* doi:10.1007/s12035-014-8794-6.

Schröder, J. *et al.* (2014) MicroRNA-138 is a potential regulator of memory performance in humans. *Front. Hum. Neurosci.* 8, 501.

Vincelli, G. *et al.* (2015) *Renilla* luciferase reporter assay to study 3'UTR-driven posttranscriptional regulations of OPRM1. *Methods Mol. Biol.* 1230, 53–63.

CARDIOLOGY & CARDIOVASCULAR MEDICINE

Chiang, D. Y. *et al.* (2015) Identification of microRNA-mRNA dysregulations in paroxysmal atrial fibrillation. *Int. J. Cardiol.* 184C, 190–97.

Danielson, L. S. *et al.* (2013) Cardiovascular dysregulation of miR-17-92 causes a lethal hypertrophic cardiomyopathy and arrhythmogenesis. *FASEB J.* 27, 1460–67.

Kojima, Y. *et al.* (2014) Cyclin-dependent kinase inhibitor 2B regulates efferocytosis and atherosclerosis. *J. Clin. Invest.* 124, 1083–97.

Maegdefessel, L. *et al.* (2014) miR-24 limits aortic vascular inflammation and murine abdominal aneurysm development. *Nat. Commun.* 5, 5214.

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