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Short Communication

MIR744 (microRNA 744)

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Abstract

MiR-744 is a short, single-stranded non-coding RNA molecule. Gene encoding miR-744 locates at chromosome 17. Two mature forms (miR-744-5p and miR-744-3p) have been reported to be implicated in cellular process leading to the development of human diseases. The function of miR-744 is dependent on cell type and contexts. MiR-744 could function as tumor suppressor or tumor promoter and the role varies in different cancer types.

Keywords
MicroRNA-744, MicroRNA-744-5p, MicroRNA-744-3p

Identity

Other names: hsa-mir-744, MIRN744, miR-744

HGNC (Hugo): MIR744

Location: 17p12

Local order
Based on Mapviewer Genes on Sequence, genes flanking MIRN10B oriented from centromere to telomere on 17p12 includes:

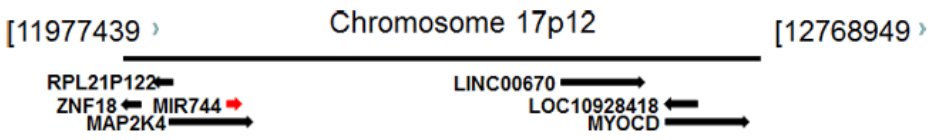
DNA/RNA

Description

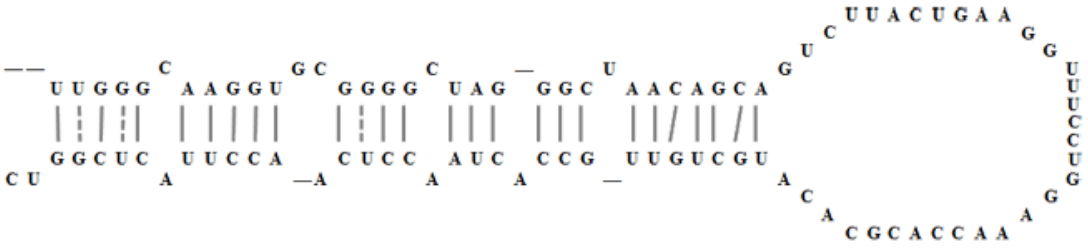
RNA Sequence:
Pre-hsa-miR-744 (MI0005559):
UUGGGCAAGGUGCGGGGCUAGGGCUAACA
GCAGUCUUACUGAAGGUUUCCUGGAAACC
ACGCACAUGCUGUUGCCACUAACCUCAAC
CUUACUCGGUC
Mature miR-744-5p (MIMAT0004945):
11-UGCGGGGCUAGGGCUAACAGCA-32
Mature miR-744-3p (MIMAT0004946):
68-CUGUUGCCACUAACCUCAACCU-89

Transcription

Primary miR-744 is transcribed by RNA polymerase II to generate pri-miRNA in the nucleus. Nuclear pri-hsa-miR-744 is processed by RNase III, Drosha, generating stem-loop structured RNAs called pre-hsa-miR-744. Pre-hsa-miR-744 is then exported into the cytoplasm. In the cytoplasm, another RNase III, Dicer, cleaves the pre-hsa-miR-744 and generates 2 mature miRNAs: hsa-miR-744-5p (previously known as hsa-miR-744), and hsa-miR-744-3p (previously known as hsa-miR-744*).



Genomic localization of pri-miR-744 (chromosome 17p12)



The stem- loop structure of pre-miR-744

Protein

MicroRNAs are not translated into amino acids

Mutations

Mutations have not been described.

Implicated in

Breast cancer

miR-744-5p was able to suppress the cancer cell growth by reducing proto-oncogene eukaryotic translation elongation factor 1A(eEF1A2) expression in MCF7 cells. Moreover, over-expression of this microRNA could be induced by candidate anti-tumor agent resveratrol, suggesting that miR-744-5p could perform as a novel regulator involved in the resveratrol-related therapy (Vislovukh et al., 2013).

Cervical carcinoma

Expression of miR-744-5p is responsive to the administration of 1'S-1'-acetoxychavicol acetate (ACA) and cisplatin (CDDP) in cervical carcinoma cell line Ca Ski (low sensitivity to cisplatin) and HeLa (high sensitivity to cisplatin). Cervical cancer cell lines treated with ACA and/ or CDDP over two hours exhibited an enhancement on expression in miR-744-5p. Further, the predicted target transcripts are involved in signaling pathways regulating apoptosis and cell cycle progression (Phuah et al., 2013). In HeLa cells transfected with siRNA against T-cell intracellular antigen 1 (TIA1) and TIA1 related/like (TIAR/TIAL1), significant increase in miR-744-5p was observed (Sánchez-Jiménez et al., 2013)

Gastric cancer (GC)

In GC, serum miR-744-5p quantity could act as early cancer marker. High circulating miR-744-5p level was found in early GC patients. Comparing the diagnostic efficacy with the other candidate markers, miR-744-5p showed the greatest area under the curve (AUC) value (Song et al., 2012). In a retrospective study using pre-diagnosis serum collected at different time-point before confirmation of GC, serum miR-744-5p level was shown to be elevated gradually during GC development (Song et al., 2012).

Hepatocellular carcinoma (HCC)

Under-expression of miR-744-5p was observed in HCC tissues compared with the normal counterparts (Tan et al, 2014; Lin et al., 2014). Furthermore, reduced miR-744-5p exhibited a significant linkage with HCC cases demonstrating multiple tumor nodes or microvascular invasion (Tan et al., 2014). In HCC cell lines with low endogenous miR-744-5p expression, introduction of miR-744 mimics reduced HCC growth (Lin et al., 2014). Using luciferase reporter assays, it was demonstrated that miR-744-5p was able to suppress the HCC cell growth by targeting c-Myc (Lin et al., 2014). HCC tissues with low miR-744-5p had higher c-Myc protein expression (Lin et al., 2014).

Prognosis

The HCC cases with relative lower miR-744-5p expression level had higher recurrence rate after receiving liver transplantation. Mature miR-744-5p could serve as an independent prognostic predictor for the overall survival and recurrence-free survival in HCC patients (Tan et al., 2014).

Head and neck cancer (HNC)

Disease

High expression of miR-744-5p was found in head and neck cancer (Nurul-Syakima et al., 2011).

Multiple myeloma (MM)

Reduced circulating miR-744-5p level is linked to MM. Compared with the healthy controls, MM patients exhibited a significantly lower circulating level of serum miR-744-5p, especially in the cases at advanced stage. Quantity of miR-744-5p was positively related with the seral level of albumin, hemoglobin and thrombocytes. In contrast, it was negatively correlated with the level of ?2-microglobulin, creatinine and lactate dehydrogenase. It is suggested that miR-744-5p is involved in the regulation of tumor mass and tumor activity (Kubiczkova et al., 2014).

Prognosis

MM patients with relatively higher serum miR-744-5p level had a better chance to survive than the serum miR-744-5p reduced group (Kubiczkova et al.,

2014). Low miR-744-5p level was associated with poor overall survival and time to progression (Kubiczkova et al., 2014).

Prostate adenocarcinoma

Prolonged overexpression of miR-744-5p exerted a suppression on tumorigenesis in vivo, which might be due to chromosomal instability in prostate adenocarcinoma cells caused by prolonged activation of Ccnb1 (Huang et al., 2012). In prostate adenocarcinoma cell line, miR-744-5p overexpression, however, was found to be able to promote the cancer cell growth by enhancing the Cyclin B1 (Ccnb1) expression.

Chronic hepatitis B infection (CHB)

Down-regulation of miR-744-5p was positively correlated with the severity of liver injury (Zhang et al., 2012). Serum miR-744-5p level was found to be a precise marker for distinguishing CHB, non-alcohlic steatohepatitis (NASH) patients from healthy controls. Further, miR-744-5p level was correlated with liver functional parameters (Zhang et al., 2012).

Chikungunya Virus (CHIKV) Infection

In NEK293T cells (origin: human embryonic kidney cells) and human dermal fibroblasts infected with CHIKV, significant increase in miR-755-5p expression is observed in 12 hour (Sexena T et al., 2013).

Early onset pre-eclampsia (EOPE)

In chorioamniotic membranes tissue collected from early onset pre-eclampsia cases, promoter of miR-744-5p gene was found to be hypermethylated (Ching et al., 2014). The functions of miR-744-5p in pre-eclampsia remains to be elucidated.

Breast cancer

MiR-744-3p was found to be one of the microRNAs significantly down-regulated in HER2-positive breast cancers compared with the HER2-negative ones. Furthermore, overexpression of miR-744-3p resulted in the suppression of growth in HER2-positive breast cancer cell line KLP-4 and downregulation of HER2 expression (Leivonen et al., 2014).

References

Ching T, Song MA, Tiirikainen M, Molnar J, Berry M, Towner D, Garmire LX. Genome-wide hypermethylation coupled with promoter hypomethylation in the chorioamniotic membranes of early onset pre-eclampsia. Mol Hum Reprod. 2014 Sep;20(9):885-904

Huang V, Place RF, Portnoy V, Wang J, Qi Z, Jia Z, Yu A, Shuman M, Yu J, Li LC. Upregulation of Cyclin B1 by miRNA and its implications in cancer. Nucleic Acids Res. 2012 Feb;40(4):1695-707

Kubiczkova L, Kryukov F, Slaby O, Dementyeva E, Jarkovsky J, Nekvindova J, Radova L, Greslikova H, Kuglik P, Vetesnikova E, Pour L, Adam Z, Sevcikova S, Hajek R. Circulating serum microRNAs as novel diagnostic and prognostic biomarkers for multiple myeloma and monoclonal gammopathy of undetermined significance. Haematologica. 2014 Mar;99(3):511-8

Leivonen SK, Sahlberg KK, Mäkelä R, Due EU, Kallioniemi O, Børresen-Dale AL, Perälä M. High-throughput screens identify microRNAs essential for HER2 positive breast cancer cell growth. Mol Oncol. 2014 Feb;8(1):93-104

Lin F, Ding R, Zheng S, Xing D, Hong W, Zhou Z, Shen J. Decrease expression of microRNA-744 promotes cell proliferation by targeting c-Myc in human hepatocellular carcinoma. Cancer Cell Int. 2014;14:58

Nurul-Syakima AM, Yoke-Kqueen C, Sabariah AR, Shiran MS, Singh A, Learn-Han L. Differential microRNA expression and identification of putative miRNA targets and pathways in head and neck cancers. Int J Mol Med. 2011 Sep;28(3):327-36

Phuah NH, In LL, Azmi MN, Ibrahim H, Awang K, Nagoor NH. Alterations of microRNA expression patterns in human cervical carcinoma cells (Ca Ski) toward 1'S-1'-acetoxychavicol acetate and cisplatin. Reprod Sci. 2013 May;20(5):567-78

Sánchez-Jiménez C, Carrascoso I, Barrero J, Izquierdo JM. Identification of a set of miRNAs differentially expressed in transiently TIA-depleted HeLa cells by genome-wide profiling. BMC Mol Biol. 2013 Feb 6;14:4

Saxena T, Tandon B, Sharma S, Chameettachal S, Ray P, Ray AR, Kulshreshtha R. Combined miRNA and mRNA signature identifies key molecular players and pathways involved in chikungunya virus infection in human cells. PLoS One. 2013;8(11):e79886

Song MY, Pan KF, Su HJ, Zhang L, Ma JL, Li JY, Yuasa Y, Kang D, Kim YS, You WC. Identification of serum microRNAs as novel non-invasive biomarkers for early detection of gastric cancer. PLoS One. 2012;7(3):e33608

Tan YL, Bai ZG, Zou WL, Ma XM, Wang TT, Guo W, Liu J, Li JS, Jie-Yin, Zang YJ, Zhang ZT. miR-744 is a potential prognostic marker in patients with hepatocellular carcinoma. Clin Res Hepatol Gastroenterol. 2015 Jun;39(3):359-65

Vislovukh A, Kratassiouk G, Porto E, Gralievska N, Beldiman C, Pinna G, El'skaya A, Harel-Bellan A, Negrutskii B, Groisman I. Proto-oncogenic isoform A2 of eukaryotic translation elongation factor eEF1 is a target of miR-663 and miR-744. Br J Cancer. 2013 Jun 11;108(11):2304-11

Zhang H, Li QY, Guo ZZ, Guan Y, Du J, Lu YY, Hu YY, Liu P, Huang S, Su SB. Serum levels of microRNAs can specifically predict liver injury of chronic hepatitis B. World J Gastroenterol. 2012 Oct 7;18(37):5188-96

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