MIR331 (microRNA 331)

Keith M Giles, Michael R Epis, Peter J Leedman

Laboratory for Cancer Medicine, Western Australian Institute for Medical Research and University of Western Australia Centre for Medical Research, Perth, WA 6000, Australia (KMG, MRE, PJL)

Published in Atlas Database: November 2012
Online updated version: http://AtlasGeneticsOncology.org/Genes/MIR331ID51220ch12q22.html
DOI: 10.4267/2042/48869

This work is licensed under a Creative Commons Attribution-Noncommercial-No Derivative Works 2.0 France Licence.
© 2013 Atlas of Genetics and Cytogenetics in Oncology and Haematology

Identity
Other names: MIRN331, hsa-mir-331
HGNC (Hugo): MIR331
Location: 12q22
Local order: Genes flanking MIR331 on 12q22 are:
- VEZT (vezatin)
- METAP2 (methionyl aminopeptidase 2)

DNA/RNA
Description
miR-331 is an intergenic microRNA gene.

Transcription
The primary transcript of miR-331 (pri-miR-331) is not currently known.

Pre-microRNA-331 (Precursor microRNA)
Accession: M10000812
Length: 94 nt
Sequence:
5'-GAGUUUGGUUUGGUUGGUUGUUCUAGG-

Mature miR-331-3p
Accession: MIMAT0000760
Length: 21 nt
Sequence: 61 - gccccugggcuauccuagaa - 81

Mature miR-331-5p
Accession: MIMAT0004700
Length: 22 nt
Sequence: 26 - cuagguaugggcuauccuagaa - 47

Pseudogene
No pseudogenes have been reported for miR-331.

Protein
Note
N/A; microRNAs are not translated.

Figure 1: Stem-loop structure of miR-331, with mature miR-331-3p and miR-331-5p sequences highlighted in purple.
Mutations

Note
No mutations in MIR331 have been described.

Implicated in

Prostate cancer

Note
Five references have suggested a tumour suppressor role for miR-331 in prostate cancer.

The first report demonstrated downregulation of miR-331-3p in prostate cancer, and showed that this promoted ERBB-2 expression and AKT activity.

Restoring miR-331-3p to prostate cancer cell lines reduced androgen receptor (AR) pathway signaling and PSA expression.

Another report confirmed the reduced expression of miR-331-3p in aggressive prostate cancers.

Two other studies showed that the RNA-binding protein HuR induces ERBB-2 expression in prostate cancer by preventing the degradation of ERBB-2 mRNA by miR-331-3p, and that miR-331-3p inhibits the growth of prostate cancer cells in part by repressing expression of the deoxypyruvase hydroxylase (DOHH), an enzyme that controls the activity of the eukaryotic translation initiation factor eIF5A.

In the latter study, an inverse correlation between miR-331-3p and DOHH expression was observed in human prostate cancer tissues.

A fifth publication confirmed that miR-331-3p is a prostate cancer tumour suppressor via its regulation of KLK4 expression in prostate cancer cells.

Leukaemia

Note
Two references implicate miR-331 in leukaemia. One report showed that the levels of miR-331-5p were inversely correlated with expression of P-glycoprotein, a drug resistance factor, in leukaemia cell lines with variable resistance to doxorubicin, and that transfection of these cell lines with miR-331-5p increased their sensitivity to doxorubicin. Lower levels of miR-331-5p were also detected in patients following treatment relapse.

A second study reported that miR-331 was overexpressed in acute lymphocytic leukaemia (ALL) and chronic lymphocytic leukaemia (CLL), and it was speculated that miR-331 might have roles in haematopoiesis and leukaemogenesis by promoting STAT activation through its regulation of the mRNA target SOCS1.

Gastric cancer

Note
One reference has suggested that miR-331-3p is a gastric cancer tumour suppressor. miR-331-3p was downregulated in gastric cancer cell lines, where transient overexpression of miR-331-3p reduced E2F1 expression and blocked cell cycle progression.

Liver cancer

Note
Increased circulating levels of miR-331 in a rat model of hepatocarcinogenesis suggest that miR-331 may have utility as a biomarker for the development and/or progression of liver cancer.

Asbestos-related lung cancer

Note
One report identified miR-331-3p in a set of overexpressed miRNAs in asbestos-related lung cancer, suggesting that it might have diagnostic use.

Natural killer (NK) cell activation

Note
Activation of NK cells by IL-2, IL-15 and IL-21 was shown to regulate expression of specific miRNAs in NK cells, including miR-331-3p. This suggested that miR-331-3p may have a role in the activation of NK cells.

Cerebral ischaemia

Note
miR-331 expression in cerebral ischaemia was regulated by the mood stabiliser and histone deacetylase inhibitor valproic acid (VPA), suggesting that it may have a role in this disease process.

References


Atlas Genet Cytogenet Oncol Haematol. 2013; 17(4)


Epis MR, Giles KM, Kalinowski FC, Barker A, Cohen RJ, Leedman PJ. Regulation of expression of deoxyhypusine hydroxylase (DOHH), the enzyme that catalyzes the activation of eIF5A, by miR-331-3p and miR-642-5p in prostate cancer cells. J Biol Chem. 2012 Oct 12;287(42):35251-9


This article should be referenced as such: