

SUPPLEMENTARY MATERIALS I. S. ILNITSKIY, ET AL. "INTEGRATION OF HiMoRNA AND RNA-Chrom: VALIDATION OF THE FUNCTIONAL ROLE OF LONG NON-CODING RNAS IN THE EPIGENETIC REGULATION OF HUMAN GENES USING RNA-CHROMATIN INTERACTOME DATA"

Supplementary Table 1. lncRNA gene correspondence table between HiMoRNA and RNA-Chrom

https://himorna.fbras.ru/data/lncRNA_CorrespondenceTable.csv

Supplementary Table 2. Contingency table for calculating right-tailed and left-tailed Fisher's test, for example, for the pair lncRNA PVT1 – histone mark H3K27ac peaks

	Total number of "-" peaks H3K27ac	Total number of "+" peaks H3K27ac
Total number of "+" and "-" peaks supported by PVT1 contacts	Number of supported by contacts PVT1 "-" peaks H3K27ac	Number of supported by contacts PVT1 "+" peaks H3K27ac
Total number of "+" and "-" peaks not supported by PVT1 contacts	Number of unsupported PVT1 "-" peaks H3K27ac	Number of unsupported PVT1 "+" peaks H3K27ac

Supplementary Table 3. Step-by-step analysis of lncRNA MIR31HG using the integrated HiMoRNA and RNA-Chrom databases

Web resource	Step	Current page	Actions	Result
HiMoRNA	1	Homepage	Click "Search page" or "Search" button	Search page
	2	Search page	- add "MIR31HG" in the corresponding field - select the histone modifications of interest (H3K4me1, H3K27ac) - add the genomic coordinates of the extended <i>GLI2</i> promoter region (chr2:120725622-120992653) - click the "Search" button	Search results page
	Optional	Search results page	- click on the histone modification	Histone mark page
			- click on the lncRNA hyperlink	lncRNA page
			- click on the gene hyperlink	Histone modification peak associated gene page
			- click on the correlation coefficient hyperlink	Correlation coefficient page
			- click on the "Download" button	Download the table with the search results
	3	Search results page	- select the peak of interest using the switch to the left of the table - click on the "Go to RNA-Chrom DB" button, then on "MIR31HG RNA contacts with the locus (peak_473655)" and select the required peak coordinate extension (for example, 25000)	Graphical summary of lncRNA MIR31HG contacts with chromatin in the extended peak region
RNA-Chrom	4	Graphic summary page	- select the experiment of interest using the flag (Exp. ID: 9) - click on the button "ALL TARGET GENES"	Table with all genes from the extended peak region that MIR31HG interacts with or does not interact with

Web resource	Step	Current page	Actions	Result
HiMoRNA	5	Search page	- add “MIR31HG” to the corresponding field - select the histone modifications of interest (H3K4me1, H3K27ac) - add the names of 56 genes from the “Hedgehog signaling pathway” category to the “Gene/Gene ID (optional)” field – click the “Search” button	Search results page
	6	Search results page	- select peak H3K27ac_963553 (chr9:95446174-95452554) - click on the button “Go to RNA-Chrom DB”, then on “MIR31HG RNA contacts with the locus (peak_963553)” and select the required extension of peak coordinates (for example, 25000)	Graphical summary of lncRNA MIR31HG contacts with chromatin in the extended peak region
RNA-Chrom	7	Graphic summary page	- select the experiment of interest using the flag (Exp. ID: 5) - click on the button “ALL TARGET GENES”	Table with all genes from the extended peak region with which MIR31HG interacts or not, among which we find PTCH1

Supplementary Table 4. Genes from the “Hedgehog Signaling Pathway” obtained from the KEGG Pathway database

Original Alias	Converted Alias	Gene Name	Description	Namespace
KEGG:04340	ENSG00000010282	HHATL	hedgehog acyltransferase like [Source:HGNC Symbol;Acc:HGNC:13242]	KEGG
KEGG:04340	ENSG00000036257	CUL3	cullin 3 [Source:HGNC Symbol;Acc:HGNC:2553]	KEGG
KEGG:04340	ENSG00000054392	HHAT	hedgehog acyltransferase [Source:HGNC Symbol;Acc:HGNC:18270]	KEGG
KEGG:04340	ENSG00000055130	CUL1	cullin 1 [Source:HGNC Symbol;Acc:HGNC:2551]	KEGG
KEGG:04340	ENSG00000064309	CDON	cell adhesion associated, oncogene regulated [Source:HGNC Symbol;Acc:HGNC:17104]	KEGG
KEGG:04340	ENSG00000072062	PRKACA	protein kinase cAMP-activated catalytic subunit alpha [Source:HGNC Symbol;Acc:HGNC:9380]	KEGG
KEGG:04340	ENSG00000072803	FBXW11	F-box and WD repeat domain containing 11 [Source:HGNC Symbol;Acc:HGNC:13607]	KEGG
KEGG:04340	ENSG00000072840	EVC	EvC ciliary complex subunit 1 [Source:HGNC Symbol;Acc:HGNC:3497]	KEGG
KEGG:04340	ENSG00000074047	GLI2	GLI family zinc finger 2 [Source:HGNC Symbol;Acc:HGNC:4318]	KEGG
KEGG:04340	ENSG00000081479	LRP2	LDL receptor related protein 2 [Source:HGNC Symbol;Acc:HGNC:6694]	KEGG
KEGG:04340	ENSG00000082701	GSK3B	glycogen synthase kinase 3 beta [Source:HGNC Symbol;Acc:HGNC:4617]	KEGG
KEGG:04340	ENSG00000100077	GRK3	G protein-coupled receptor kinase 3 [Source:HGNC Symbol;Acc:HGNC:290]	KEGG
KEGG:04340	ENSG00000102858	MGRN1	mahogunin ring finger 1 [Source:HGNC Symbol;Acc:HGNC:20254]	KEGG

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Original Alias	Converted Alias	Gene Name	Description	Namespace
KEGG:04340	ENSG00000105429	MEGF8	multiple EGF like domains 8 [Source:HGNC Symbol;Acc:HGNC:3233]	KEGG
KEGG:04340	ENSG00000106012	IQCE	IQ motif containing E [Source:HGNC Symbol;Acc:HGNC:29171]	KEGG
KEGG:04340	ENSG00000106571	GLI3	GLI family zinc finger 3 [Source:HGNC Symbol;Acc:HGNC:4319]	KEGG
KEGG:04340	ENSG00000107882	SUFU	SUFU negative regulator of hedgehog signaling [Source:HGNC Symbol;Acc:HGNC:16466]	KEGG
KEGG:04340	ENSG00000108854	SMURF2	SMAD specific E3 ubiquitin protein ligase 2 [Source:HGNC Symbol;Acc:HGNC:16809]	KEGG
KEGG:04340	ENSG00000110092	CCND1	cyclin D1 [Source:HGNC Symbol;Acc:HGNC:1582]	KEGG
KEGG:04340	ENSG00000111087	GLI1	GLI family zinc finger 1 [Source:HGNC Symbol;Acc:HGNC:4317]	KEGG
KEGG:04340	ENSG00000113712	CSNK1A1	casein kinase 1 alpha 1 [Source:HGNC Symbol;Acc:HGNC:2451]	KEGG
KEGG:04340	ENSG00000117425	PTCH2	patched 2 [Source:HGNC Symbol;Acc:HGNC:9586]	KEGG
KEGG:04340	ENSG00000118971	CCND2	cyclin D2 [Source:HGNC Symbol;Acc:HGNC:1583]	KEGG
KEGG:04340	ENSG00000121067	SPOP	speckle type BTB/POZ protein [Source:HGNC Symbol;Acc:HGNC:11254]	KEGG
KEGG:04340	ENSG00000128602	SMO	smoothened, frizzled class receptor [Source:HGNC Symbol;Acc:HGNC:11119]	KEGG
KEGG:04340	ENSG00000131437	KIF3A	kinesin family member 3A [Source:HGNC Symbol;Acc:HGNC:6319]	KEGG
KEGG:04340	ENSG00000133275	CSNK1G2	casein kinase 1 gamma 2 [Source:HGNC Symbol;Acc:HGNC:2455]	KEGG
KEGG:04340	ENSG00000137486	ARRB1	arrestin beta 1 [Source:HGNC Symbol;Acc:HGNC:711]	KEGG
KEGG:04340	ENSG00000139549	DHH	desert hedgehog signaling molecule [Source:HGNC Symbol;Acc:HGNC:2865]	KEGG
KEGG:04340	ENSG00000141480	ARRB2	arrestin beta 2 [Source:HGNC Symbol;Acc:HGNC:712]	KEGG
KEGG:04340	ENSG00000141551	CSNK1D	casein kinase 1 delta [Source:HGNC Symbol;Acc:HGNC:2452]	KEGG
KEGG:04340	ENSG00000142875	PRKACB	protein kinase cAMP-activated catalytic subunit beta [Source:HGNC Symbol;Acc:HGNC:9381]	KEGG
KEGG:04340	ENSG00000143147	GPR161	G protein-coupled receptor 161 [Source:HGNC Symbol;Acc:HGNC:23694]	KEGG
KEGG:04340	ENSG00000144228	SPOPL	speckle type BTB/POZ protein like [Source:HGNC Symbol;Acc:HGNC:27934]	KEGG
KEGG:04340	ENSG00000144857	BOC	BOC cell adhesion associated, oncogene regulated [Source:HGNC Symbol;Acc:HGNC:17173]	KEGG

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Original Alias	Converted Alias	Gene Name	Description	Namespace
KEGG:04340	ENSG00000151292	CSNK1G3	casein kinase 1 gamma 3 [Source:HGNC Symbol;Acc:HGNC:2456]	KEGG
KEGG:04340	ENSG00000154309	DISP1	dispatched RND transporter family member 1 [Source:HGNC Symbol;Acc:HGNC:19711]	KEGG
KEGG:04340	ENSG00000163501	IHH	Indian hedgehog signaling molecule [Source:HGNC Symbol;Acc:HGNC:5956]	KEGG
KEGG:04340	ENSG00000164161	HHIP	hedgehog interacting protein [Source:HGNC Symbol;Acc:HGNC:14866]	KEGG
KEGG:04340	ENSG00000164690	SHH	sonic hedgehog signaling molecule [Source:HGNC Symbol;Acc:HGNC:10848]	KEGG
KEGG:04340	ENSG00000165059	PRKACG	protein kinase cAMP-activated catalytic subunit gamma [Source:HGNC Symbol;Acc:HGNC:9382]	KEGG
KEGG:04340	ENSG00000166167	BTRC	beta-transducin repeat containing E3 ubiquitin protein ligase [Source:HGNC Symbol;Acc:HGNC:1144]	KEGG
KEGG:04340	ENSG00000166813	KIF7	kinesin family member 7 [Source:HGNC Symbol;Acc:HGNC:30497]	KEGG
KEGG:04340	ENSG00000169118	CSNK1G1	casein kinase 1 gamma 1 [Source:HGNC Symbol;Acc:HGNC:2454]	KEGG
KEGG:04340	ENSG00000171791	BCL2	BCL2 apoptosis regulator [Source:HGNC Symbol;Acc:HGNC:990]	KEGG
KEGG:04340	ENSG00000173020	GRK2	G protein-coupled receptor kinase 2 [Source:HGNC Symbol;Acc:HGNC:289]	KEGG
KEGG:04340	ENSG00000173040	EVC2	EvC ciliary complex subunit 2 [Source:HGNC Symbol;Acc:HGNC:19747]	KEGG
KEGG:04340	ENSG00000175356	SCUBE2	signal peptide, CUB domain and EGF like domain containing 2 [Source:HGNC Symbol;Acc:HGNC:30425]	KEGG
KEGG:04340	ENSG00000180138	CSNK1A1L	casein kinase 1 alpha 1 like [Source:HGNC Symbol;Acc:HGNC:20289]	KEGG
KEGG:04340	ENSG00000180447	GAS1	growth arrest specific 1 [Source:HGNC Symbol;Acc:HGNC:4165]	KEGG
KEGG:04340	ENSG00000185716	MOSMO	modulator of smoothened [Source:HGNC Symbol;Acc:HGNC:27087]	KEGG
KEGG:04340	ENSG00000185920	PTCH1	patched 1 [Source:HGNC Symbol;Acc:HGNC:9585]	KEGG
KEGG:04340	ENSG00000198742	SMURF1	SMAD specific E3 ubiquitin protein ligase 1 [Source:HGNC Symbol;Acc:HGNC:16807]	KEGG
KEGG:04340	ENSG00000203965	EFCAB7	EF-hand calcium binding domain 7 [Source:HGNC Symbol;Acc:HGNC:29379]	KEGG
KEGG:04340	ENSG00000213923	CSNK1E	casein kinase 1 epsilon [Source:HGNC Symbol;Acc:HGNC:2453]	KEGG
KEGG:04340	ENSG00000283900	TPTEP2-CSNK1E	TPTEP2-CSNK1E readthrough [Source:HGNC Symbol;Acc:HGNC:53829]	KEGG

Supplementary Table 5. Step-by-step analysis of lncRNA PVT1 using integrated databases HiMoRNA and RNA-Chrom

Web resource	Step	Current page	Actions	Result
HiMoRNA	1	Homepage	- click "Search page" or "Search" button	Search page
	2	Search page	- add "PVT1" in the corresponding field - select all histone modifications - add "LATS2" to the "Gene/Gene ID" field - click on the "Search" button	Search results page
	3	Search results page	- select the peak of interest using the switch to the left of the table (for example, peak_169403) - click on the "Go to RNA-Chrom DB" button, then on "PVT1 RNA contacts with the locus (peak_169403)" and select the required peak coordinate extension (for example, 25000)	Graphical summary of lncRNA PVT1 contacts with chromatin in the extended peak region
RNA-Chrom	4	Graphic summary page	- select the experiment of interest using the flag (Exp.IDs: 8, 10) - click on the button "VIEW IN GENOME BROWSER"	UCSC Genome Browser