

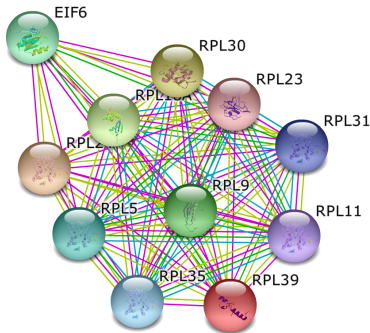
RAIN: RNA–protein Association and Interaction Networks

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The STRING database (<http://string-db.org/>)

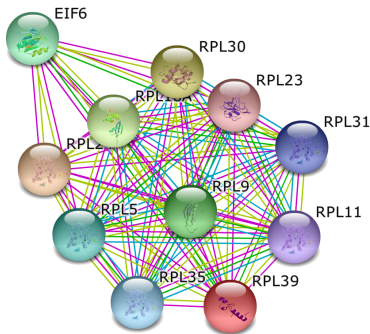
- protein-protein interaction networks for 2031 organisms
- integrates known and predicted protein-protein associations, e.g.,
 - experiments
 - text-mining
 - genomic context
- interactions are scored according to their reliability



[Szkarczyk et al., Nucl. Acids Res., 2015]

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- protein-protein interaction networks for 2031 organisms
- integrates known and predicted protein-protein associations, e.g.,
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- interactions are scored according to their reliability
- **no such resource for ncRNA interactions**

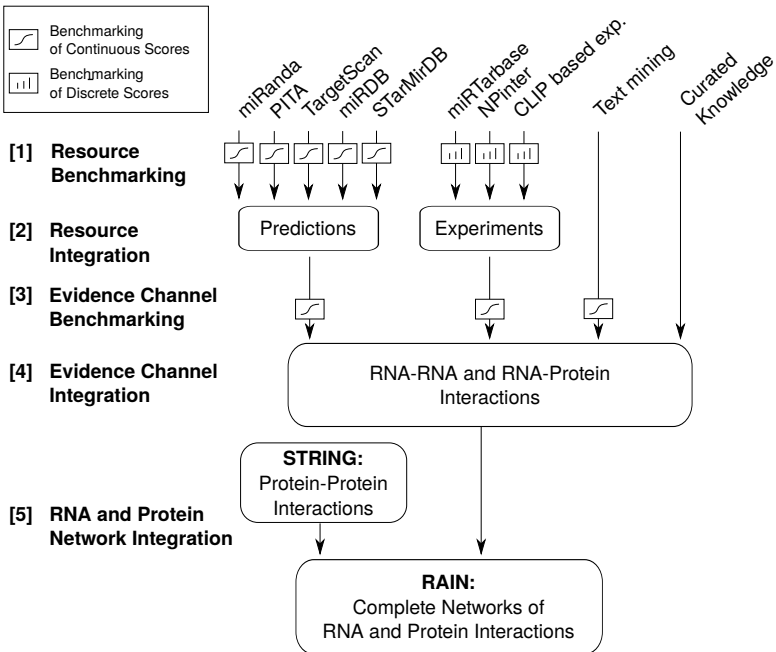


[Szklarczyk et al., Nucl. Acids Res., 2015]

RAIN - main features

- 1 **collects** ncRNA-RNA and ncRNA-protein interactions from various sources
- 2 **unifies** ncRNA and protein interactions

RAIN pipeline



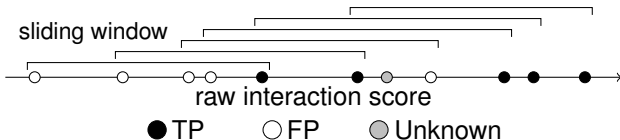
From raw interaction scores to confidences

miRNA	Target	Raw score
miR-4685-5p	KRAS	16.8
miR-548at-3p	RUNX1	13.2
miR-205-3p	ELF2	2.0
⋮	⋮	⋮

→ translate (predicted) raw scores into confidence scores $\in [0, 1]$
by fitting a calibration curve

From raw interaction scores to confidences

Gold standard: expert curated miRNA-mRNA interactions



From raw interaction scores to confidences

Gold standard: expert curated miRNA-mRNA interactions



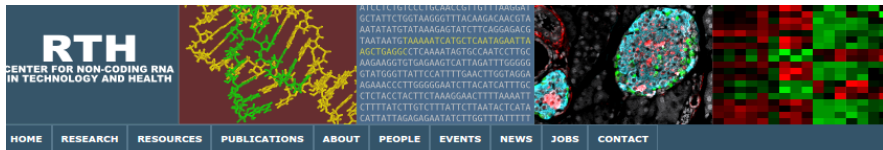
RAIN interaction counts

Interactions with confidence score > 0.15

	miRNA–mRNA	ncRNA–protein	ncRNA–ncRNA	Total
<i>H. sapiens</i> (Human)	174,853	11,026	2,507	188,386
<i>M. musculus</i> (Mouse)	77,270	469	35	77,774
<i>R. norvegicus</i> (Rat)	19,985	39	1	20,025
<i>S. cerevisiae</i> (Yeast)	0	640	85	725
Total	272,108	12,174	2,628	286,910

RAIN webinterface

<http://rth.dk/resources/rain>



The header banner features the RTH logo on the left, a central image of a DNA double helix, and a right section with a microarray heatmap and a cell image. Below the banner is a dark navigation bar with white text for various site sections.

RTH
CENTER FOR NON-CODING RNA
IN TECHNOLOGY AND HEALTH

HOME RESEARCH RESOURCES PUBLICATIONS ABOUT PEOPLE EVENTS NEWS JOBS CONTACT

RAIN: RNA-protein Association and Interaction Networks

Search for interactions by non-coding RNA (ncRNA) or gene identifier in an organism of interest.

ncRNA or gene identifier: (examples: [#1](#) [#2](#))

[Help](#) [?](#)

organism(*):

Search

- Single name
- Multiple names

Help

Download

The following ncRNAs and/or genes match your input. Please review the list, click the desired name directly.

ncRNAs:

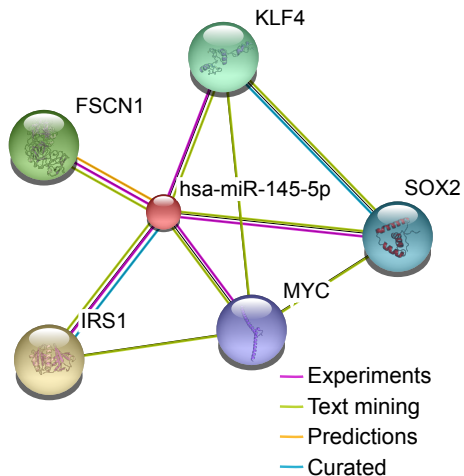
ncRNA "mir-145":

[hsa-miR-145-3p](#)

[hsa-miR-145-5p](#)

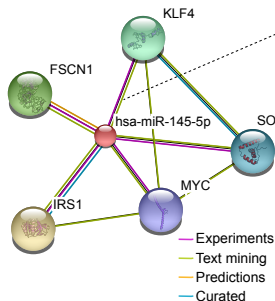
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Interaction

hsa-miR-145-5p
description: Homo sapiens miR-145-5p
genetype: miRNA

↔

KLF4 [ENSP00000363804]
Kruppel-like factor 4 (gut); Transcription factor; can act both as activator and as repressor. Binds the 5'-CACCC-3' core sequence. Binds to the promoter region of its own gene and can activate its own transcription. Regulates the expression of key transcription factors during embryonic development. Plays an important role in maintaining embryonic stem cells, and in preventing their differentiation. Required for establishing the barrier function of the skin and for postnatal maturation and maintenance of the ocular surface. Involved in the differentiation of epithelial cells and may al [...]

Evidence suggesting a functional link:

Neighborhood in the Genome:	none / insignificant.
Gene Fusions:	none / insignificant.
Cooccurrence Across Genomes:	none / insignificant.
Co-Expression:	none / insignificant.
Experimental/Biochemical Data:	none / insignificant.
Association in Curated Databases:	none / insignificant.
Co-Mentioned in PubMed Abstracts:	none / insignificant.

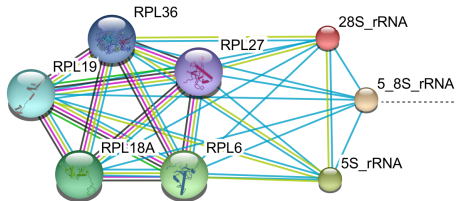
Additional data from

Experimental data:	0.829 miRTarBase;StarBase2.0	Show
Text-mining:	0.697 Textmining	Show

Combined Score: 0.945

RAIN webinterface

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5_8S_rRNA

Information

description: 5.8S ribosomal RNA
[Source:RFAM;Acc:RF00002]; RNA, 5.8S ribosomal 5
[Source:HGNC Symbol;Acc:HGNC:37660]
genetype: rRNA

more info

Actions

- re-center network on this node
- remove node from input nodes

Conclusion - RAIN

- **integrate** different sources of ncRNA-target interactions
- **convert** raw interaction scores to confidences
- **provide** research community with more complete picture
 - protein-protein interactions
 - ncRNA-protein interactions
 - ncRNA-RNA interactions

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- Nadezhda Doncheva
- Adrian Geissler
- Giulia Corsi

More tools: <http://rth.dk/resources>

External collaborators:

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