Small (20–30 nt) RNAs are associated with members of the Argonaute (Ago) family, which comprise two subfamilies: Ago and Piwi. Based on their biogenesis mechanism and the type of Argonaute proteins that they associate with, at least three classes of small RNAs can be distinguished in eukaryotes: microRNAs (miRNAs), endogenous small interfering RNAs (endo-siRNAs) and Piwi-interacting RNAs (piRNAs). miRNAs control mRNA stability and translation by targeting cognate mRNAs. Endo-siRNAs suppress repetitive genes by cleaving their transcripts. Some piRNAs mediate RNA cleavage or heterochromatin formation of transposons, although the functions of most piRNAs are still unknown.

**Possible mechanisms of action**

- **miRNA cleavage** (miRNAs and endo-siRNAs)
  - **Ago**
    - Ago2
  - **Piwi**
    - PIWI
  - **Transposons and piRNA clusters**
    - RNA cleavage
  - **MILI (PIWIL2 in humans)**

- **Transitional regression** (piRNA)
  - **AGO7**
  - **AGO6**
  - **AGO4**

- **Deadenylation and miRNA degradation** (miRNA)
  - **AGO1–4**

- **Heterochromatin formation** (RNA methylation and/or histone modification)
  - **AGO1–4**
  - **AGO2**

**Components of the RISC complex at Alcam**

Alcam is a diffuse chromomeric body of all the very last and most up-to-date antibodies to components of the RISC complex. It is biochemically involved in the number of CHIP-grade and batch tested antibodies, enabling the research community to deconstruct epigenetic pathways. Two of our very best RISC antibodies:

- **Ago2** (ab13502)
- **AGO1** (ab42018)

All our antibodies to the components of the RISC complex are highly characterized and our datasheets provide a library of relevant information. Further at www.abcam.com/RISC

**Contact information**

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For further reading, see www.nature.com/nrem/for-/664x46844

**Linker review article**


**Table 1: Eukaryotic small RNAs are associated with Argonaute-family proteins**

<table>
<thead>
<tr>
<th>Family</th>
<th>Ago-family protein</th>
<th>Class of small RNA*</th>
<th>Length of small RNA</th>
<th>Origin of small RNA</th>
<th>Mechanism of action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mammals</td>
<td>Ago</td>
<td>AGO1–4</td>
<td>miRNA</td>
<td>21–23 nt</td>
<td>miRNA genes</td>
</tr>
<tr>
<td></td>
<td>Piwi</td>
<td>PIW1 (in humans)</td>
<td>Piwi-pRNA</td>
<td>23–27 nt</td>
<td>piRNA clusters</td>
</tr>
<tr>
<td></td>
<td></td>
<td>PIW2 (in humans)</td>
<td>Piwi-pRNA</td>
<td>23–27 nt</td>
<td>piRNA clusters</td>
</tr>
</tbody>
</table>

**Shdominant-membrane**

<table>
<thead>
<tr>
<th>Ago</th>
<th>AGO1–4</th>
<th>miRNA</th>
<th>21–23 nt</th>
<th>miRNA genes</th>
<th>Translational repression, miRNA degradation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Piwi</td>
<td>PIW1 (in humans)</td>
<td>endo-siRNA</td>
<td>21–23 nt</td>
<td>Intergenic repetitive genes, pseudogenes and endo-siRNA clusters</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PIW2 (in humans)</td>
<td>si-pRNA</td>
<td>22–24 nt</td>
<td>Small interfering RNA (siRNA)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PIW3 (in humans)</td>
<td>micro-pRNA</td>
<td>21–24 nt</td>
<td>Micro RNA (miRNA)</td>
<td></td>
</tr>
</tbody>
</table>

**Schizophrenia**

| Ago |AGO7–4 | miRNA | 21–23 nt | miRNA genes | Translational repression, miRNA degradation |

**Abbreviations**


**Acknowledgements**

This work was supported by the Japan Science and Technology Agency (JST), Core Research for Evolutional Science and Technology (CREST), 2014-2015, Japan.

*Small RNAs that are the main partners of a given Ago protein are listed. "siRNA," in a class, is representative of all class types, whereas endo-siRNAs and piRNAs are expressed abundantly in germline cells and contribute to germ cell development.

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