

Reconciling Views of the micro-RNA Silencing Mechanism

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microRNAs are involved in down-regulating target genes in critical pathways, such as development and cancer, in mice, worms and mammals.

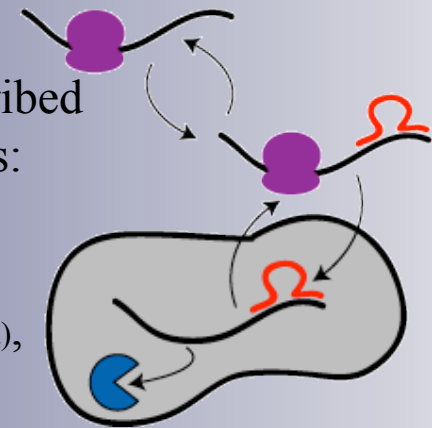
Gene silencing is achieved by specific yet imperfect basepairing of the miRNA and its target messenger RNA (mRNA).

Recently, the common view that miRNAs inhibit protein synthesis without affecting mRNA levels has been challenged by seemingly contradicting evidences.

We propose a simple mathematical model, that puts different proposed mechanisms on equal footing, and enables comparison and predictions for possible effects, yet to be discovered.

Within our model, mRNA (black) are described in three possible states:

- free, (ribosomes in purple)
- bound to miRNA (red),
- or silenced (e.g. by localization into processing bodies), exposed to proteolysis (blue).



Our analysis suggests that whether the mRNA level is or is not reduced together with protein level depends on its inherent translation and degradation properties, rather than on those of the miRNA silencing mechanism.