



microRNA Functions

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Introduction

What?

Biogenesis

Other Small Noncoding RNAs

Target Identification

Modes of Function

Switch-like and Fine Tuning

Proliferation/Apoptosis

Feedback Loops

Tresholding

miRNA in Human Diseases



What?

- ▶ non-coding, single-stranded RNA molecules
- ▶ 21-24 nucleotides
- ▶ regulate gene expression posttranscriptional



Biogenesis

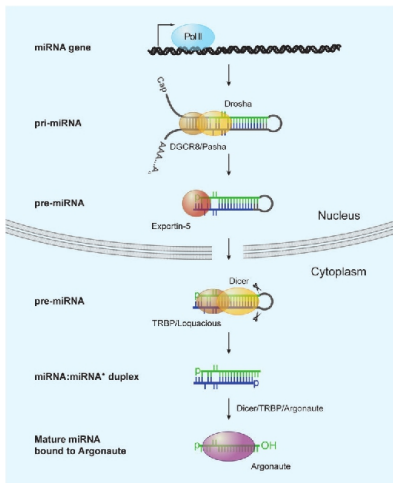


Figure: Biogenesis of microRNA





- ▶ Small interfering RNA (siRNA)
- ▶ Piwi-interacting RNA (piRNA)



Switch-like and Fine Tuning

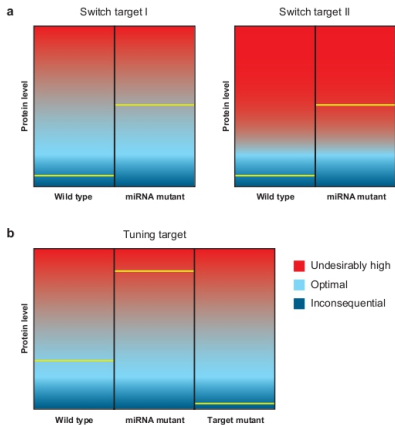


Figure: (a) targets are downregulated to inconsequential levels, mutants have harmless or detrimental levels (b) miRNA adjusts levels to optimal

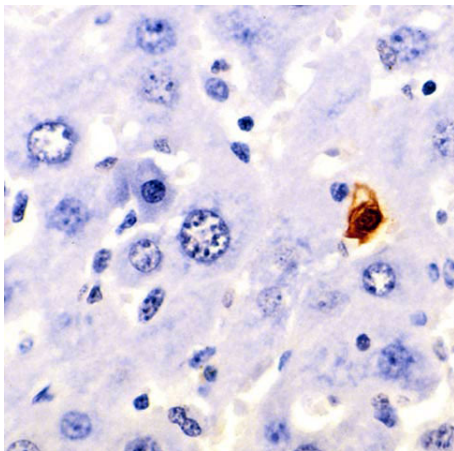


Figure: Section of mouse liver showing an apoptotic cell stained with terminal desoxyribosyl-transferase mediated dUTP end labelling stain





Feedback Loops

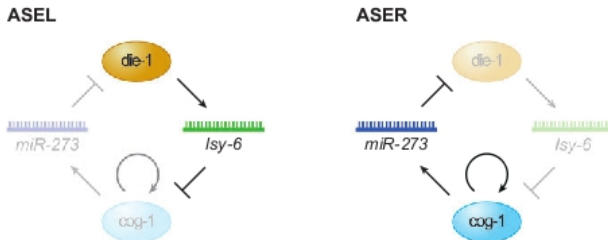


Figure: *miR-7* in photoreceptor differentiation



Tresholding

- ▶ *miR-9a* involved in regulation of *senseless*
- ▶ no other examples known



- ▶ *miR-189* in Tourette's syndrome
- ▶ altered miRNA expression in human primary tumors
- ▶ *miR-51* hides infected cells from the immune system
- ▶ *miR-32* restrict the replication of *PFC-1*



Natascha Bushati, Stephen M. Cohen, *microRNA Functions*