# RNA INTERFERENCE

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# What is RNA interfernce

- biological process in which RNA molecules inhibit gene expression or translation
- It is abbreviated as RNAi
- It needs siRNA or miRNA

# siRNA

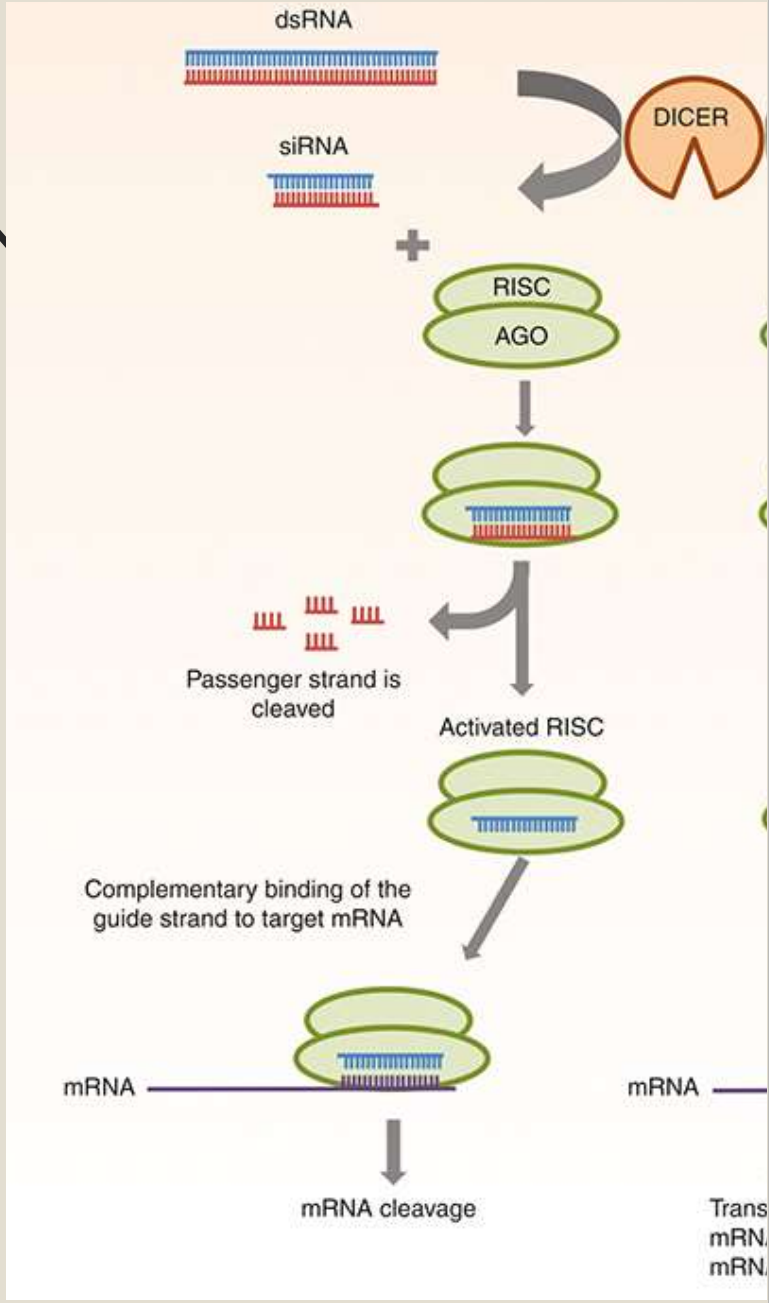
- Small interfering RNA
- 21-25bp(bese pair)
- duplex
- perfectly same as mRNA
- degrades mRNA
- exogenous

# miRNA

- microRNA
- About 22 bp
- Partially different from mRNA
- Represses mRNA
- endogenous

# Mechanism of siRN

- Dicer make dsRNA smaller
- RISC binds siRNA
- It cleaves passenger strand
- RISC-guide strand complex recognize and cleave mRNA




https://www.researchgate.net/figure/Gene-silencing-mechanisms-of-siRNA-and-miRNA-siRNA-dsRNA-either-transcribed-or_fig1_282035687 2019/7/1

# RISC

- RNA-induced silencing complex
- The complete structure of RISC is still unsolved.

# AGO

- Argonaute
- Essential component of RISC
- Active site of RISC

# Mechanism of miRNA

- miRNA is made from DNA
- miRNA forms heirpin structure
- miRNA is cut by Drasha

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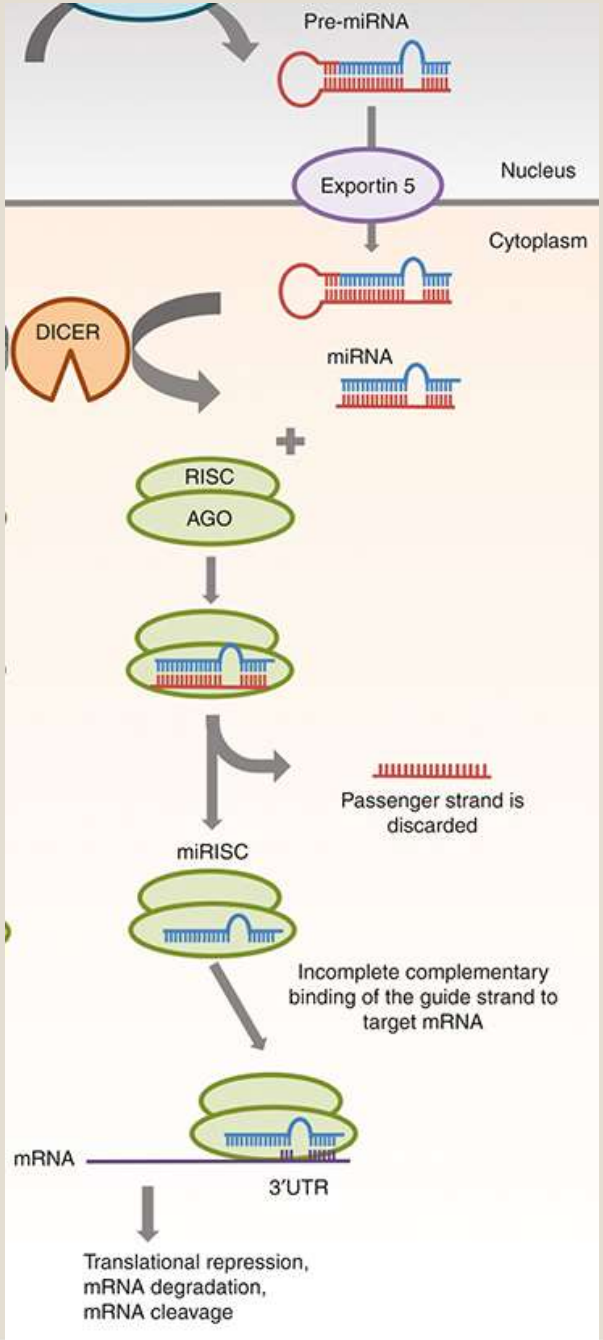
# Mechanism of miRN

- mRNA is transported Nucleus to Cytoplasm by Exportin
- Almost same process as mechanism of siRNA

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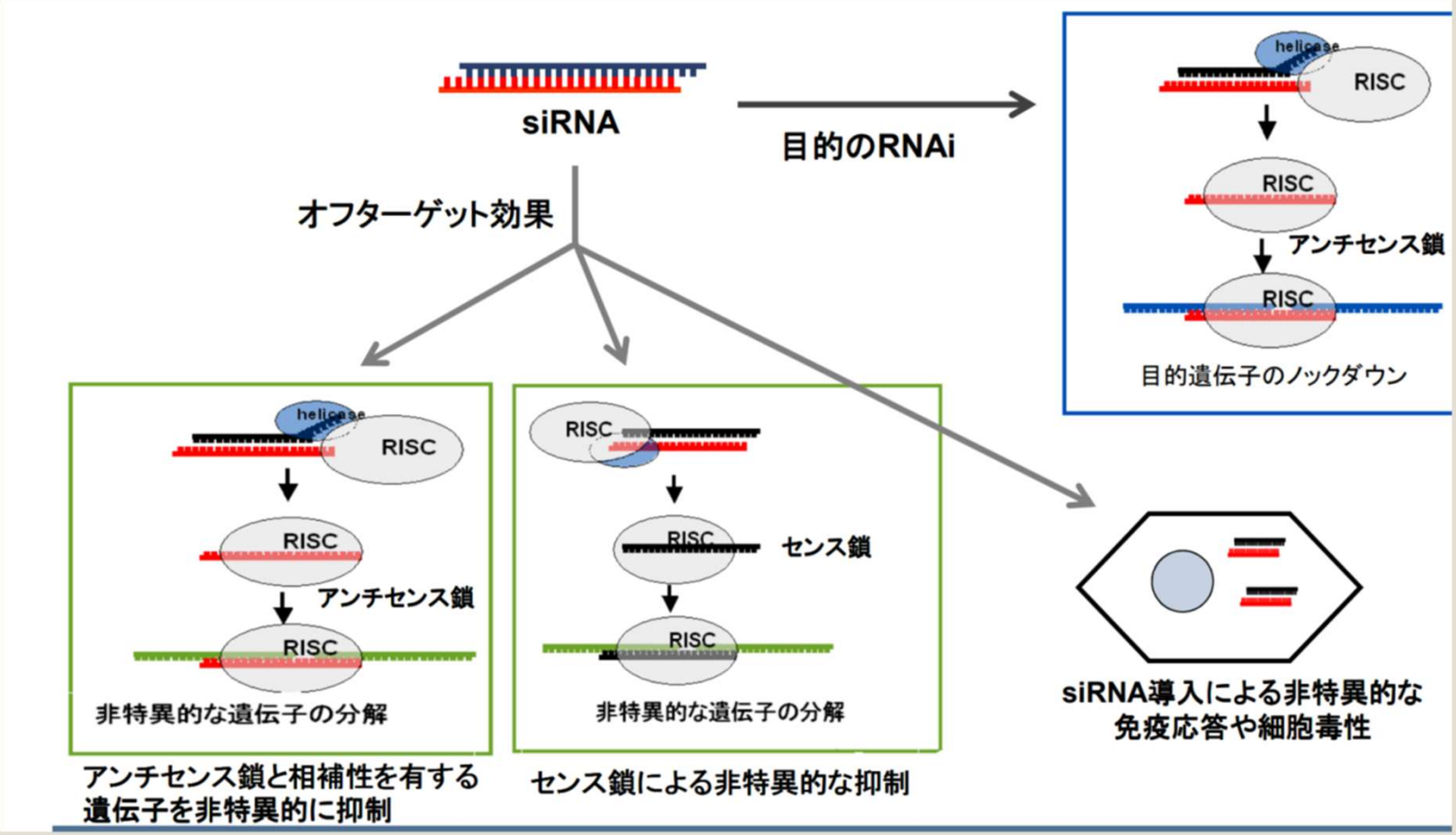
# Off-target effect

- mRNA which is not target mRNA is also repressed

# Off-target effect

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# Off-target effect

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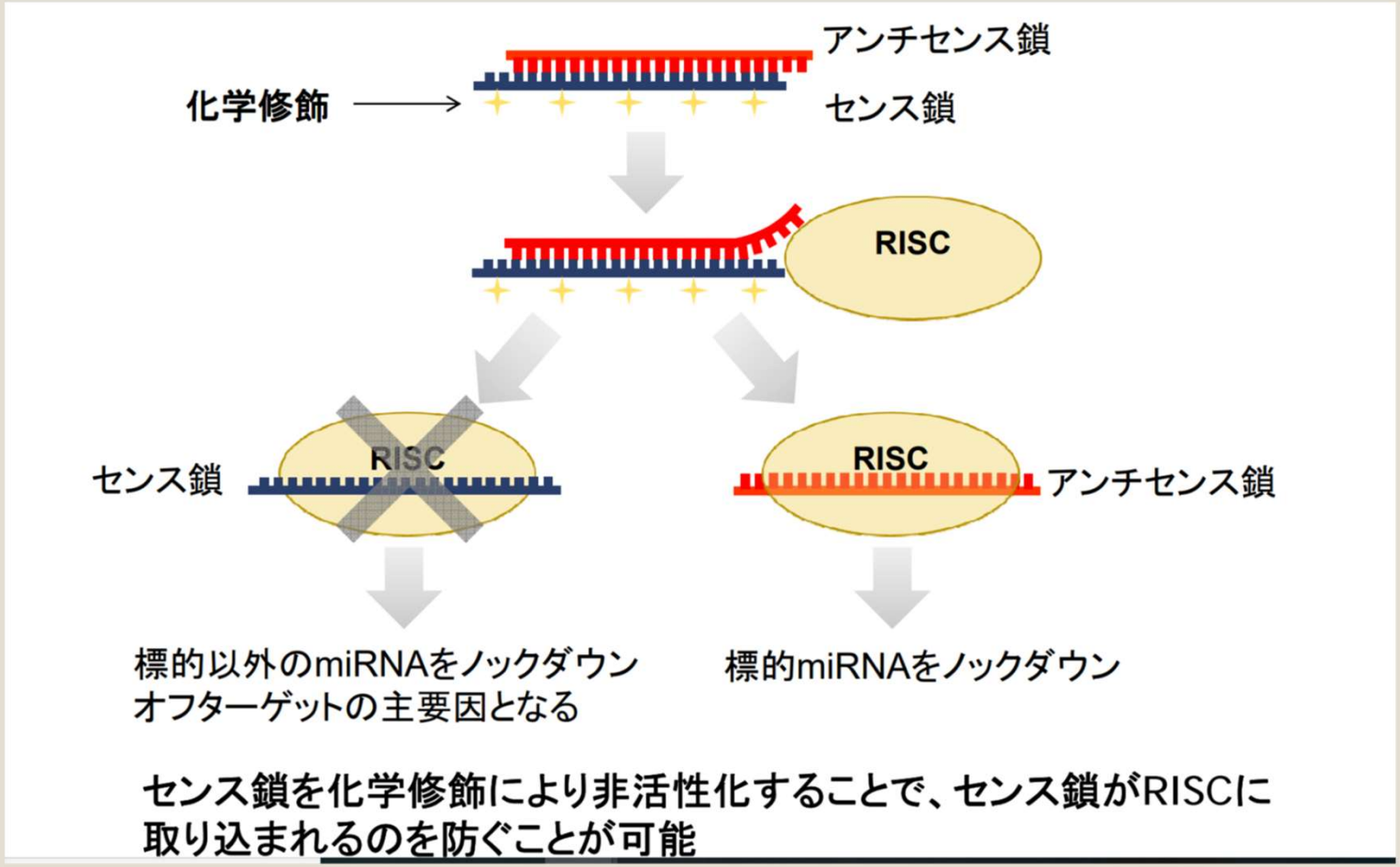
# To repress off-target effect

- Low concentration
- Chemical modification

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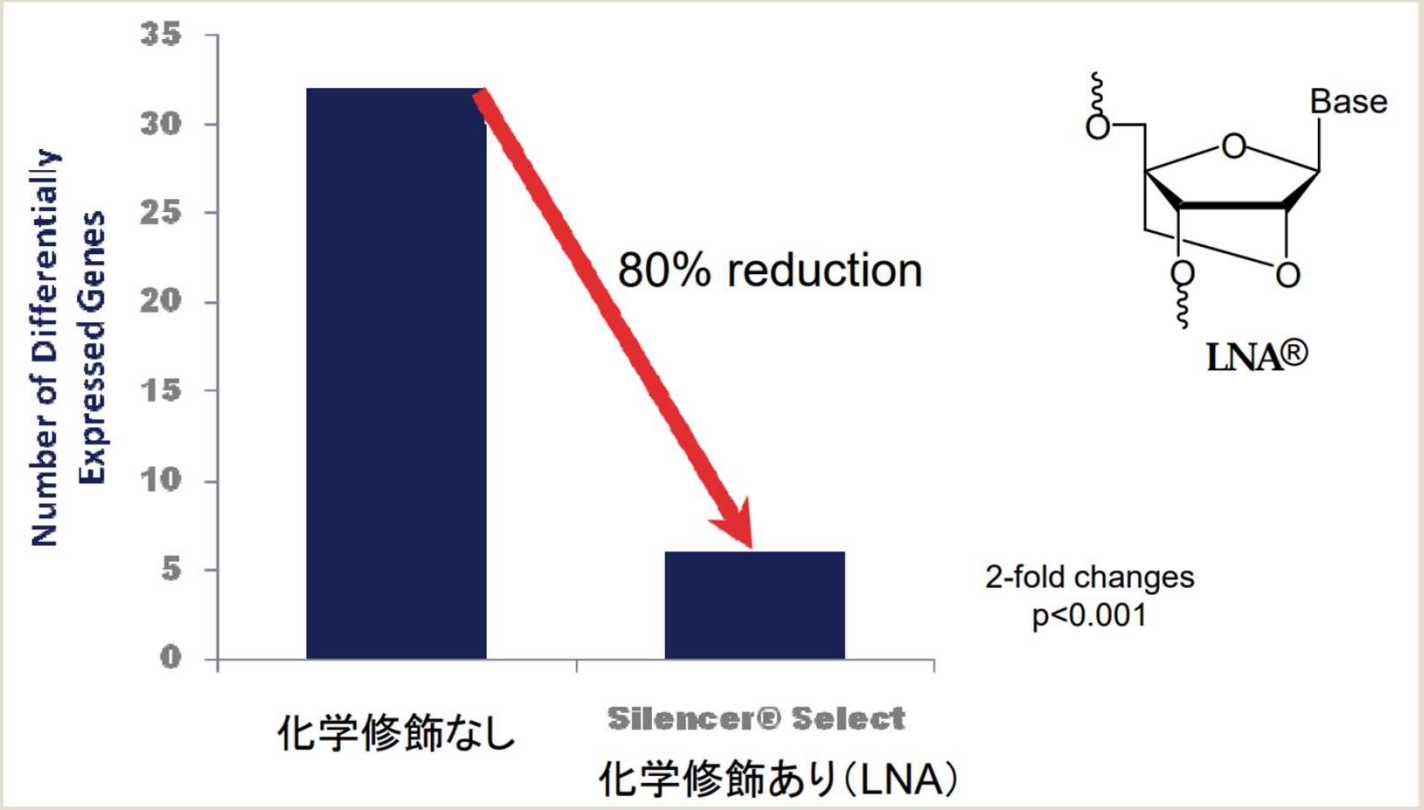


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# Application

- Gene knockdown
- Functional genomics
- Medicine
- Biotechnology

# Patisiran

- the first small interfering RNA-based drug
- medication for the treatment of polyneuropathy
- $C_{412}H_{520}N_{148}O_{290}P_{40}$
- 21bp

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# 参考文献


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